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THE INTERESTS, ABILITIES AND
ACHIEVEMENTS OF A SPECIAL
CLASS FOR GIFTED CHILDREN

By

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TEACHERS COLLEGE, COLUMBIA UNIVERSITY
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CHAPTER I

PROVISION FOR THE EDUCATION OF GIFTED CHILDREN BY MEANS OF THE SPECIAL CLASS: HISTORY AND PROBLEMS

Now the most important object of all educational schemes is to catch these exceptional people and turn them to account for the good of society. No man can say where they will crop up; like their opposites, the fools and the knaves, they appear sometimes in the palace and sometimes in the hovel; but the great thing to be aimed at, I was about to say, the most important end of all social arrangements, is to keep these glorious sports of Nature from being either corrupted by luxury or starved by poverty, and to put them into the position in which they can do the work for which they are especially fitted.

— HUXLEY

In the many years since Huxley thus summed up the duty of society towards its highly gifted members, social institutions, especially educational systems, have made some slight progress toward attaining the goals the above quotation suggests. The present study summarizes the results of one attempt to “catch these exceptional people and turn them to account for the good of society.” Before turning to this study it will be worth while to review briefly what has already been done to provide suitable education for the gifted.

TYPES OF EDUCATIONAL PROVISION FOR GIFTED CHILDREN

Provisions for the education of gifted children may be classified as follows: (1) Flexible promotion schemes. (2) Rapid advancement classes, which aim to cover the usual curriculum more rapidly than the average child does. (3) As in (2), plus special changes in method suggested by the abilities of the children. (4) “Enriched” courses, in which time is not gained, but subjects not in the usual curriculum are added. (5) “Enriched” courses, with modification of methods. (6) Combinations of (2) and (4), or (3) and (5), in which some time is gained and some new subject-matter is added, with or without modification of method. (7) Individual instruction by parent, tutor, or other special teacher.

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A classified bibliography of books and articles will be found on pages 10 to 15. References under certain headings are classified

as being with or without statistical data. The studies of Special Talent under the first heading are given as samples of work being done, and make no attempt at a comprehensive survey of the field.¹ The references included in the bibliography give information as to the psychological study of gifted individuals, the administrative problems connected with the education of the gifted, and accounts of actual classes for bright children. In the following pages references from the bibliography will be referred to by number, thus [24].

HISTORICAL SUMMARY OF EDUCATIONAL PROVISION FOR THE GIFTED

The following historical summary can touch on only the most important points. For detailed information the reader is referred to the classified bibliography.

The first type of provision for the gifted in America was probably the flexible promotion scheme. This we shall mention only in passing. An excellent summary and criticism of such plans may be found in the first chapter of T. S. Henry's *Classroom Problems in the Education of Gifted Children* [80]. Among the most serious objections to such a program for the gifted are the following: (1) Bright children are left in classes with the average and dull pupils. (2) Thus no modification of method in favor of the bright is possible. (3) There is likely to be little change in curriculum to meet the needs of the gifted. (4) It is difficult to make certain moral and idealistic appeals which the average and dull cannot appreciate as do the gifted.

As an outgrowth of the flexible promotion plan came the rapid advancement class. A group of children whom the teachers considered unusually bright were segregated, and advanced rapidly through the work of the grades. These were, as a rule, in the upper grades of the elementary school, and some high school courses were often added. Such classes were begun as early as 1900, in New

¹ A word should be said as to the selection of the references given in the bibliography. An attempt was made to exclude articles which do not make some useful contribution. The author has notes on seventy or more books and articles not included in the bibliography; most of these were given in one or another of the bibliographies of gifted children which have come into her hands. And yet none of these contribute useful data in addition to that covered by the articles that are listed. Many of them are not useful in any sense; others are various wordings of the plea, "We should have more and better provision for the gifted." The latter are valuable in arousing public interest, but contribute little to the solution of problems. The author wishes to acknowledge especial indebtedness to the bibliographies of Terman and Chase [100], Whipple [101] and Henry [99].

York City and Worcester, Mass. [80]. Within the next ten years such classes were begun in various cities, among which were the following: Baltimore [85]; Indianapolis [89]; Lincoln, Neb. [54]; Rochester, N. Y. [54]; Harrisburg [50]; Manchester, England [53]; Lead, S. D. [80]; Framingham [80]; Cambridge, Mass. [84]; and a few cities in Michigan [57]. In a number of these classes special methods adapted to the bright children are reported.

Interest in the education of the gifted was stimulated by the psychologists' studies of the nature and relationships of high intellectual abilities. One of the first of these, by Yoder, in 1894 [23], was undertaken because the author realized the lack of proper education for the gifted. He hoped that a study of the boyhood of great men would give suggestions as to how bright children should be educated. It was not until 1905 that studies of the mental traits of the gifted were carefully carried out, by the help of psychological tests. At this time Terman [7] began his work with the gifted which, continued to the present time, has aroused much interest in this field, and has stimulated other workers. In the fall of 1921, Terman began what is probably the most comprehensive study of gifted children ever undertaken. With a carefully trained corps of research assistants he is making a survey of California, to discover the highly endowed children. These, when located, will be studied in detail, and will then be carefully followed through their subsequent educational and vocational careers. The work of Whipple [73] has also contributed to studies in this field, although undertaken for a different purpose. Special attention may also be drawn to the studies of Jones [3], Pyle [6] and Yates [11].

In addition to group studies of the abilities of the gifted, there have been published a number of careful case-studies of gifted children, which make use of intelligence test records. Some of these will be briefly mentioned here. 1. Thirty-nine months old child. M.A. of $4\frac{1}{2}$ years by Binet-Simon. One of first of such studies published, 1913. [28] 2. Five-year old E. M.A. of 11 years by unrevised Binet. Vocabulary of 7,000 words. [32] 3. Account by Terman of 11 children with I.Q.'s of 120 or more. [71] 4. Francis Galton. I.Q. in childhood estimated as 200. [42] 5. English boy of 7-9, with M.A. of 15. [42] 6. Boy of 8-4, with M.A. of 15-7. I.Q. 187. [30] 7. Girl of 9-10. M.A. 16-5. I.Q. 167. [29] 8. Case-studies of 41 superior children, whose

I.Q.'s range from 130 to 184. [36] 9. Case-studies of 25 children with I.Q.'s of 120 or more. Many described as neurotic. Author does not sufficiently take into account the peculiar selection of her children. Criticism of Terman not substantiated by data of article, but certain general educational recommendations are probably correct. [31] 10. Boy much interested in geography at 4 years. I.Q. 168. [33] 11. Gifted juvenile authoress, Betty, who at 9 years has I.Q. of 188. [37]¹ To these may be added three accounts by parents of their education of bright children under 6 years of age: of Erich, who at 4 years could read, write and do simple arithmetic [40]; of Barbara who learned to read, write and spell through use of the typewriter at 3 or 4 years [39]; of Martha who at 26 months could read twenty or more new primer pages, and add twenty or more words to her vocabulary, in half an hour [35].

It was not until 1907 or 1908 that there began to appear in American journals suggestions that rapid advancement classes were not solving the problem of the education of the gifted. One of the first of these was voiced by Kendall at the N.E.A. meetings in 1908 [92]. Articles by William Stern [95] in the *Journal of Educational Psychology* in 1911 probably helped much to arouse discussion in this field. In the following years pleas for Special classes for the gifted became more frequent. Whipple was one of the most active of the early workers for such classes. If we turn to other countries than the United States, we find this problem appearing earlier. In 1904 Petzoldt [94] published a very comprehensive article in a German educational magazine, in which he gave reasons for establishing Special classes for the gifted, and also suggested a program of work. This account is of special interest from the standpoint of the history of this movement.

In the rapid advancement classes children were selected by teachers' and principals' judgments; the same was true of the first Special classes which attempted to use special curricula and methods. Psychological tests, however, were soon used to aid in selection, and the Binet test, through the work of Goddard [63] and Terman [71], was found to be a most helpful instrument. The

¹ Books by children, such as Opal Whiteley's *The Story of Opal*, and Hilda Conkling's *Poems by a Little Girl*, are fascinating additions to the psychology of the gifted (when the age of the writer and the authenticity of the book is fully established). However, they would be much more useful if supplemented by mental ages and I.Q.'s and other data of the type Terman and Fenton report in the case of Betty.

use of tests other than the Binet was studied by Whipple, and the results appeared in 1919 in his *Special Classes for Gifted Children* [73]. The publication of large numbers of group tests of general intelligence has assisted greatly in the preliminary selection of bright children in school. During the last three years a number of articles and books have appeared in Germany, describing their new work in selecting children for Special classes. William Stern, Erich Stern, Piorkowski, Hische and others have been active in this work [64, 66, 67, 68, 69, 70, 72]. Selection is, as a rule, made by tests taken from pure psychology, rather than by intelligence scales; tests of attention, memory, imagination and judgment are among those used. The articles published indicate that a thoroughly satisfactory combination of tests has not yet been found.

Theoretical discussion of what the curricula and methods for bright children should be have appeared from time to time, and attention may be directed especially to articles by Collicott [90], Stern [95], Whipple [98] and Petzoldt [94].

The most useful data as to method and curriculum are found in detailed accounts of what has actually been done in Special classes. We shall now review the work of several Special classes, in which rapid advancement has been combined with an enriched curriculum, and special methods have been used.

In 1911 Unrich [87] reported a class of 32 bright 4th and 5th grade children in Cincinnati; special methods were used, and 25 completed two years' work in one. Not selected by tests. In 1914 Adler [75] published an account of one of the first cases of the selection of a class of bright children by the Binet tests. One class contained 35 first graders, and the other 36 fourth graders, both with high mental ages. Special methods of instruction were used, and advancement was more rapid than the average.

In 1916 a group of bright 4 B children were selected by Race [81, 82], and formed into a Special class in Louisville, Ky. I.Q.'s ranged from 123 to 168, with a median of 137. Material was covered rapidly, subjects were added to the curriculum, and special methods were used. Much improvement in social attitudes was noted. This is an excellent example of a well-chosen and well-conducted class.

In 1918, the four following accounts appeared:

1. L. Stedman [86] reported the formation of a class for the very bright in the training school of the Los Angeles Normal School.

The children, who were in grades 4 A, 5 A and 6 B, were not selected by tests. In six months the work accomplished ranged from one to two years, depending on the ability of each child. Subjects were added to the curriculum and methods were varied.

2. Gosling [79] published an account of a Special class in Cincinnati; the children, who were beginning Grade 7, were chosen by teachers' judgment. Later testing showed I.Q.'s ranging from 99 to 149, with a median of 120. Fourteen out of twenty accomplished four years' work in two years.

3. Specht [83] contributed an article concerning a Special class in New York City. A child who was eligible for the class must possess "an I.Q. of 120 and desirable social traits." The median I.Q. was 137.5; the range was from 120 to 161. The curriculum and methods were modified to suit the children's needs. This class gives an excellent example of desirable procedure in organization and planning. During the first six months progress ranged from one to four grades.

3. Whipple [73] published an account of a Special class in Urbana, Ill. Thirty children were selected by teachers' judgments; their I.Q.'s ranged from 99 to 147; average for fifteen in the 5th grade, 119; average for fifteen in the 6th grade, 116. The majority of the group accomplished two years' work in one. The book contains a detailed comparison, by tests, of Special and Control classes. Henry's *Classroom Problems in the Education of Gifted Children*, published in 1920, contains many recommendations for class procedure, based on Henry's study of the children in Whipple's Urbana class [80].

In 1920 Cleveland [77, 78] reported Detroit classes for the gifted, which were begun in 1915. Approximately 160 bright children (I.Q.'s of 120 or higher) are placed in Special classes in three centers. The course is much enriched and three years' work are accomplished in two.

In the same year Pintner and Noble [48] published an account of the classification of a school in Columbus, on the basis of I.Q.'s and mental ages, in the course of which two classes for gifted children were organized. Emphasis is placed on enriched curriculum rather than on rapid advancement.

In Germany classes for the gifted have been organized in several cities, among which are Hanover, Hamburg and Berlin. In the published accounts which have reached this country little informa-

tion is given as to method and curricula. In Berlin about 150 children are selected for Special classes, at a given testing; and this selection may occur twice a year. In Hanover only 35 are selected once or twice a year.

The author is not under the impression that she has reported *all* the classes for gifted children which have been organized in this country, nor all the careful case-studies of gifted individuals which have been made. The data given have been based mainly on published accounts, and it is unlikely that all experiments and studies of this type have been reported in print. For instance, a class of bright children was organized at Indianola School, Columbus, Ohio, during the year 1919-20. The nineteen children who composed it were selected by teachers' judgment, but were later shown to have I.Q.'s ranging from 102 to 150, with an average of 129. The class was in charge of an excellent teacher, and did good work. There may be many such unreported Special classes.

PRESENT ATTITUDE TOWARD THE STUDY AND EDUCATION OF GIFTED CHILDREN

The present situation with respect to the study and education of the gifted in the United States may be summarized as follows: There are a number of psychologists who are deeply interested in the study of the mental and emotional characteristics of gifted children, and are conducting research in this field. Two of the most active workers are Whipple and Terman. Leaders in education are awake to the need of Special classes for the education of these bright children whom the psychologists are locating. They are eager to make use of the psychologists' help in selecting children, and in the planning of curricula and methods. Others agree that something should be done for bright children, but they do not feel any need for calling the psychologist into consultation. Still others have not at all realized the problem presented by the gifted. Among class-room teachers there is probably less appreciation of the need for such Special classes than among supervisors. There are, of course, exceptions to this; but it seems probable that the attitude of the grade teachers toward the Special class is not at first sympathetic. Until a teacher has had experience with a class from which the very dull and the very bright have been removed, she is likely to feel that the departure of the former will be a blessing, but losing the latter will detract much from the joy of

teaching. There also seems to be an unfortunate tendency among some teachers to be jealous of the bright child. They dislike to have any special attention paid to him. This seems to be especially true if the teacher is not the one to discover the child's ability. On the other hand, it is quite possible to convince teachers of the usefulness and fairness of the Special class for bright children. Widespread instruction of teachers in the values of tests and scales seems to the author one of the best ways of doing this.

One of the most hopeful signs is the number of pleas for special education for the gifted which are continually appearing in educational magazines. Active propaganda for Special classes should be carried forward by educational leaders with the help of the psychologists who have worked in this field. Articles for intelligent parents will also contribute to this movement.

SUMMARY OF REASONS FOR THE ORGANIZATION OF SPECIAL CLASSES FOR THE GIFTED

We have thus far been assuming that such Special classes are desirable. This is, however, a point which is still to be proved. It is the purpose of this study of a Special class to give some data on this question. It may, however, not be out of place to list here some of the most important considerations which argue for the organization of such classes. If a highly gifted child is left in the ordinary classroom, he wastes a large amount of time; he is likely to develop habits of laziness and lack of perseverance; he may occupy his unused time in mischief which interferes with others' work, and which forms in the gifted child selfish and thoughtless habits; he may lose interest in his work; he may grow very conceited; his high achievement may set him so apart from his fellows that he becomes self-conscious, badly-adjusted and "queer"; he is a source of discouragement and envy to the average and dull. On the other hand, if the bright child is placed in a class where *all* the children are very bright he ceases to waste time; he saves it, and therefore may have to spend a shorter time in the elementary school; he can be given a broader culture; he can be given more concrete experience with the world he lives in; he can be trained to express himself convincingly in writing and speaking; he can gradually be educated in social attitudes of responsibility, initiative and coöperation which will eventually make him a man fit to be a leader in a "true democracy."

INDIVIDUAL INSTRUCTION OF GIFTED CHILDREN

Individual instruction of the gifted is not a problem of great significance for the public school. Most bright children will be educated in groups for many years to come, and this is probably a desirable thing, especially from the standpoint of the development of social attitudes. However, accounts of the education of children by tutors, etc., may contribute useful suggestions as to curriculum and method, and data from this source may be compiled with profit. Although some of the details of a book such as Berle's *School in the Home* [88] might be criticized by an educational expert, it may be profitably read by teachers of the gifted, for the many useful suggestions it has to offer.

OUTLINE OF THE PRESENT STUDY

The study to be reported in the following chapters of this book is a detailed account of a class for gifted children which was in existence for about three and one-half semesters. A discussion of the selection of the children and the organization of the class will be followed by data on their achievement in educational tests, and their improvement in educational tests (especially in English composition), and in tests of intelligence. An account of the interests and ambitions of the children, and a record of their classroom activities will supplement the results of tests. This will be followed by case-studies of the individual children of the class; and an account of what happened to the boys and girls after they left the Special class will complete the study of this particular class. The last chapter will contain suggestions for further experimentation in the field of the education of the gifted.

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CHAPTER II

THE SELECTION AND ORGANIZATION OF A SPECIAL CLASS FOR GIFTED CHILDREN

THE SELECTION OF THE CLASS

IN the neighborhood of Ohio State University were three elementary schools; School M, to the south; School K, one mile northeast of M; and School N, one mile northwest of K. In January, 1918, it was planned to organize a class for gifted children in one of these buildings, with its members drawn from all three schools. Because of its central location, it was hoped that the class could be held in School K; in that case, a child living in the northern part of District N, or in the southern part of District M, would not be more than one and one-half miles from School K. It was decided to select the members of the class from children who in February, 1918, were in Grades 4B and 4A. Children in grades lower than these might not be able to go alone to school a distance of one and one-half miles. Children in grades higher than these are likely to have formed habits which might interfere with special class procedure.

The process of selection was carried on as follows: A group test of intelligence was given to all 4B and 4A children in the three schools. The test used consisted of two parts, administered on different days, each with a time limit of 30 minutes. The test had not been standardized for use in the lower grades, but this lack of standardization was not a serious hindrance, since our aim was simply that of selecting the brightest children in the classes examined. The material was of the familiar "omnibus" type.¹ Part I consisted of the following elements: easy opposites; verb-object; genus-species; adding 17 to each of a series of numbers; hard opposites; analogies; easy directions; hard directions; Part II contained the following tests: checking the five best definitions; checking the five best illustrations; checking the best reasons; hard opposites; subject-predicate; word completion; three sets of arithmetic problems. The scores of the various parts of the test

¹ This particular combination of tests was arranged by Thorndike.

were totaled to give a single score for the entire test. The dates on which the tests were given, the number of children tested in each group and a summary of the results are shown in Table I. The six classes furnished 89 4B children and 102 4A children, a total of 191.

TABLE I

DATA OBTAINED FROM ADMINISTERING THE OMNIBUS TEST TO 6 4TH GRADE CLASSES

School	Grade	Date of Part I	Date of Part II	Number Tested	Median Chron. Age	Median Score	Highest Score	Lowest Score
K.	4B	3-22	4- 3	41	8-11.5	60.0	149.0	9.7
K.	4A	1-22	1-29	42	9- 8	72.3	191.0	9.5
N.	4B	3- 7	3-19	39	9- 2	42.5	174.0	4.0
N.	4A	3- 7	3-19	32	9- 8	58.9	183.1	1.0
M.	4B	5-28	6- 4	9	9- 2	40.5	103.5	17.0
M.	4A	5-28	6- 4	25	9- 8	76.0	145.5	24.0

While the children were taking the first part of the test, each teacher was asked to write down the names of the five or six brightest children in the room; as a result 35 names were handed to the experimenter. It was planned to give Binet tests to all these 35 children, but only 26 of them were actually tested. To these were added 20 others who were selected entirely by their very high scores in the Omnibus test. During April, May and June, 1918, Binet tests were given by the author to these 46 children,—21 from Grade 4B, and 25 from 4A. The results of these tests are shown in Table II. The children are here arranged in the order of the Intelligence Quotients, and both grades are combined in one I.Q. ranking.

The I.Q.'s for these 46 children ranged from 100 to 156,—that is, from a child of just average mentality, up to one whom Terman would classify as "genius" or "near-genius." Twenty-eight children had I.Q.'s of 117 or higher; 14 of these were boys and 14 were girls; 16 were in Grade 4A and 12 were in 4B. The mental ages ranged from 10 years to 14 years, 3 months.

In passing, it is useful to raise the question: How well did the judgments of the teachers as to the brightest children agree with the results of the Binet tests? All but four of the 26 children from the teachers' lists would have been selected on the basis of the group tests alone. Of these four, one or 25 per cent, proved to be of gifted-class caliber, a little girl with an I.Q. of 120, who is *very slow*, but very accurate (No. 16 in Table II). The remaining three are

TABLE II
RESULTS OF BINET TESTS USED FOR SELECTION OF BRIGHT CHILDREN

Iden. Number	Chron. Age	Mental Age	I.Q.	Score in Group Test	Iden. Number	Chron. Age	Mental Age	I.Q.	Score in Group Test
1*	8- 0	12- 6	156.3	174	9*.....	9-10	11- 7	117.8	136
12*	8- 9	13- 4	152.4	149	35.....	9- 7	11- 3	117.4	151
2*	7-11	11- 8	147.4	126	10*.....	10- 2	11-11	117.2	...
25	8- 5	12- 1	143.6	118	16C	10- 5	12- 2	116.8	...
26	10- 4	14- 3	137.9	191	36.....	9- 0	10- 6	116.7	80
27	9- 6	13- 1	137.7	137	37.....	9- 8	11- 3	116.4	116
13*	9- 8	13- 3	137.1	...	38.....	9- 0	10- 5	115.7	94
3*	9- 6	12- 6	131.6	182	35C	9- 0	10- 5	115.7	...
28	8-10	11- 7	131.1	79	39.....	9- 9	11- 2	114.5	...
5*	9-10	12- 9.5	130.1	173	40.....	9- 4	10- 8	114.3	99
29	9- 0	11- 8	129.6	107	41.....	9- 7	10-11	113.9	104
30	10- 3	13- 3	129.3	161	11*.....	9-10	11- 2	113.6	147
6*	8- 9	11- 3	128.5	135	42.....	8-11	10- 1	113.1	80
31	9- 7	12- 1	126.1	...	43.....	9- 1	10- 3	112.8	100
32	8- 3	10- 3	124.3	123	44.....	10- 0	11- 3	112.5	147
14*	8- 7	10- 8	124.3	101	45.....	9- 6	10- 9	111.2	89
33	8-10.5	11- 0	123.9	104	46.....	9- 9	10- 8	109.4	60
15*	9- 2	11- 3	122.7	141	47.....	9- 2	9-10	107.3	104
7*	9- 8	11-10	122.4	137	48.....	10- 3	10-10	105.7	69
22	11- 0	12- 4	121.2	...	18C	10- 9	10-10	100.7	72
8*	9- 7	11- 7	120.9	116	49.....	9- 3	9- 3	100.0	95
34	8-10	10- 8	120.7	83					
16*	9- 0	10-10	120.4	44	4*.....	9- 3	12- 2	131.5	...
17*	8- 4	10- 0	120.0	106					
18*	8-11	10- 8	119.6	...					

No. 46, 48 and 18C in Table II; they must be classified as having only average ability. The I.Q.'s of the twenty children chosen for Binet testing because of their group test record alone ranged from 100 up to 152; 14, or 70 per cent, of them had I.Q.'s of 117 or higher. Among these was one of 152 and another of 147. These were children whom the teachers did not consider especially bright. Of the 22 children chosen for individual testing by both tests and teacher-judgment, 16, or 73 per cent, received I.Q.'s of 117 or higher. It is evident that the selection of a class of bright children merely from these recommended by the teachers would have resulted in the ignoring of *half* of the brightest boys and girls. On the other hand, the accuracy of selection is slightly increased by the addition of the teachers' judgment.¹

¹ Of the 9 children mentioned by the teachers, but not tested by the Binet Scale, all but *one* would have been recommended for individual testing by the group test score. This child's Omnibus score was 30.5, i.e., 13.5 points lower than the lowest score made by those who were individually tested.

THE ORGANIZATION OF THE CLASS

The testing of these 46 children was completed during the spring of 1918. When school re-opened in the fall plans were at once made for the organization of a Special class which should contain 18 or 20 children who had gained high I.Q.'s. At this time School K was crowded with classes, and there seemed to be no available place for the bright children. It was finally decided to use a small room in School N, which had previously been used for coaching classes; it was in every way unfitted for the Special class, but at that time it seemed to be the only available corner.

Since it was desirable to have the greatest possible coöperation from the parents of the Special class children, invitations, worded as follows, were sent to the parents of 21¹ children early in November, while the schools were closed because of influenza epidemic.

Dear Mrs. ———:

A class for very bright children will be started at N School soon after school begins again. Your child, ———, has been chosen as a member of this class. Please notify Mrs. S———, before Wednesday, November 13, whether you intend to send your child or not. If you do not answer before this date we shall select another child instead.

Mrs. E. S———, *Principal N School.*

Telephone, North ———.

The "invitations" received quick and appreciative responses from the parents. Only one mother failed to acknowledge the invitation in any way. Several parents expressed their pleasure at having their children invited to enter the class, but thought it unwise to accept the invitation, either because of the child's delicate health, or because of the great distance of the home from School N. Three little girls from School M attended the class for two weeks and were then removed because their parents felt that the trip to and from school was too long for them. Among these children who failed to enter the class, or to remain in it, were I.Q.'s of 144, 138, 130, 126, 124, and 124. Other children were chosen to take their places, but these children of "second choice" had lower I.Q.'s and thus the average intelligence level for the class was lowered. On the other hand, it was of great advantage to the class

¹ By November 1918, two of the brightest children had moved away from the city. One or two others had moved to distant parts of the city.

to have the full sympathy and coöperation of the parents of the children.¹

The class opened at N School on November 18, but schools were again closed on November 27, because of the influenza. It was not until January 2, 1919, that the children really began consecutive work. The class then consisted of 18 children, 16 of whom had had I.Q.'s of 117 or higher in the tests of the previous spring. The 17th was a boy from School K, who had received an I.Q. of only 114. By some misunderstanding, he was sent over to the class by the principal of School K and when the psychologist discovered what had happened, it was thought too late to remove the boy from the class, unless his work proved to be of poor quality. His career in the Special class will be described later. The 18th child included in the class had just moved into the city. On the recommendation of the 5th grade teacher in N School, she was given a Binet test. The result showed that she had an I.Q. of 132, and she was at once enrolled in the Special class.

Data concerning the children who composed the Special class on January 2, 1919, are given in Table II, where the numbers of these children are starred. The I.Q.'s ranged from 114 to 156, with an average of 128.5 and a median of 123.5. Since the mental ages given in Table II are for varying dates, the probable mental ages on January 2, 1919, have been calculated (by the use of the I.Q.), and the results are shown in Table III.

Of the 11 children in 5B, all but one or two were at least 6 months *younger* in chronological age than the average child for that grade; of the 7 children in 4A, 6 are at least 6 months under age. On the other hand, the median mental age for the whole group is more nearly what one would find in the average class at the middle of the 6th grade. These children are young in years, but old in mentality,

¹ Criticism has been made that conditions for the children of this Special class were unusually good, and therefore non-typical of all Special classes, in that the parents gave such excellent coöperation. It has been suggested that this might be lacking if such a class were to be organized in a poor district of the city. This objection seems to the author lacking in validity. Very bright children usually have intelligent parents. This does not necessarily mean well-educated parents, nor an atmosphere of culture in the home. But intelligent parents who have had little education are eager to have their children obtain educational advantages, and they will give hearty coöperation to the work of a Special class if they understand its purpose. In the author's opinion, an attitude of sympathy, interest and coöperation in the child's school activities is the most essential thing to be obtained from the home. This, she believes, can be found or developed in at least twenty-four out of twenty-five of all parents of gifted children.

TABLE III

CALCULATED MENTAL AGES OF SPECIAL CLASS ON JANUARY 2, 1919

5 B			4 A		
Iden. Number	Chron. Age	Mental Age	Iden. Number	Chron. Age	Mental Age
1*.....	8-9	13- 8	12.....	9- 6	14- 6
2.....	8-6	12- 5	13.....	10- 5	14- 3
3.....	10-2	13- 5	14.....	9- 4	11- 7
4.....	9-2	12- 1	15.....	9-10	12- 1
5.....	10-8	13-11	16.....	9- 8	11- 7
6.....	9-7	12- 4	17.....	9- 0	10-10
7.....	10-3	12- 7	18.....	9- 8	11- 7
8.....	10-2	12- 3			
9.....	10-5	12- 3			
10.....	10-9	12- 7			
11.....	10-8	12- 1			
Average	9-11	12- 8	Average.....	9- 8	12- 4
Median.....	10- 2	12- 5	Median.....	9- 8	11- 7
Median I.Q. 5B.....	128.5		Median I.Q. 4A.....	123.5	
Average I.Q. 5B.....	128.9		Average I.Q. 4A.....	128.0	

* Child No. 1 was in the younger group when the Omnibus test was given, but in September, 1918, he was given an extra promotion from 4B to 5B, thus placing him in the higher grade group.

compared with the average 4A and 5B class. We shall, therefore, be justified in predicting that these children will do more than average 5th grade work.

A reinforcement of the above prediction may be obtained from the scores in the Omnibus test. For the nine 5B children whose group test scores are known, the median score in this test (when they were in 4A) was 136. For the five 4A children, whose group test scores are known, the median (when they were in 4B) was 106. The median score for forty-two 5A pupils in School K was 133.2; that for twenty-three 5B pupils was 98.7. We thus see that both sections of the Special class made Omnibus test scores *one year* beyond its grade, as measured by scores in School K. This difference is not as large as that found by the Binet Scale, but other evidence to which we have access shows that the intelligence level

of School K is much higher than that of the average school. We are, therefore, comparing the selected children with unusually high norms.

During the spring of 1918, just after each Binet test was given, the author wrote down a brief summary of each child's performance in the test. These summaries will serve to indicate something of the general and special abilities possessed by the members of the class. Later we shall learn whether the subsequent study of the children substantiated this analysis of ability.¹ The statements which follow will also serve as illustrations of the amount of information, beyond the mere mental age and I.Q., which can be obtained from a Binet test:

1. Boy. Age 8-0. M.A. 12-6. I.Q. 156.3. Intelligence—"near" genius or genius.
Ability to see relationships between ideas remarkably good, about that of a 14-year-old. Memory also that of a 14-year-old. Lowest perhaps, in general language ability, although in that he reaches the 11-year standard. Very business-like in his way of going to work. In general, much more mature than the average 9- or 10-year-old.
2. Boy. Age 7-11. M.A. 11-8. I.Q. 147.4. Intelligence—very superior.
His mentality is very evenly developed, but is particularly good in ability to see relationships between ideas.
3. Boy. Age 9-6. M.A. 12-6. I.Q. 131.6. Intelligence—very superior.
General comprehension *very good*. Thinking about concrete objects remarkably good. Ability to see relationships between abstract ideas very good. Language ability not so good. Barely reaches 12-year standard in vocabulary. Memory that of a 12-year-old.
5. Boy. Age 9-10. M.A. 12-9.5. I.Q. 130.1. Intelligence—very superior.
Except that he does not come up to the standard in memory, he has a very evenly developed 12-year intelligence. In ability to think about concrete situations, he reaches the 14-year standard. Excellent "common-sense." He always knew exactly what he could and what he could not do.
6. Girl. Age 8-9. M.A. 11-3. I.Q. 128.5. Intelligence—very superior.
Remarkable memory, about that of a 15-year-old. Vocabulary and language ability poor, although latter is better than the former. General comprehension *very good*.
7. Boy. Age 9-8. M.A. 11-10. I.Q. 122.4. Intelligence—very superior.
Performance very erratic. Ability to see relationships between abstract ideas not at all good, but does remarkably well in thinking about concrete objects. Memory very good, about that of a 13- or 14-year-old. Language ability and vocabulary very poor. In the latter, he fails to reach the 9-year standard.

¹ See p. 175 for a discussion of this point.

8. Boy. Age 9-7. M.A. 11-7. I.Q. 120.9. Intelligence—superior.
Memory very good, about up to 14-year standard. General comprehension good, but does not reason well with abstract ideas. Not very mature in attitude.
9. Girl. Age 9-10. M.A. 11-7. I.Q. 117.8. Intelligence—superior.
Mathematical reasoning very good, as is also general comprehension. Vocabulary and language ability not at all good—barely reaches 10-year standard in vocabulary.
10. Boy. Age 10-2. M.A. 11-11. I.Q. 117.2. Intelligence—superior.
Very serious in manner and generally mature. Began school at 7 years. Ability to see relationships between ideas *excellent*. Vocabulary very good. Language ability good but not equal to “reasoning” ability.
11. Boy. Age 9-10. M.A. 11-2. I.Q. 113.6. Intelligence—superior.
Good memory. Remarkably good vocabulary. Very good general language ability. Ability to see relationships between ideas not good. Expect him to do very good work in reading and language but only average in mathematics.
12. Boy. Age 8-9. M.A. 13-4. I.Q. 152.4. Intelligence—“near” genius or genius.
Has a remarkable memory, passes two 18-year memory tests. Ability to see relationships between ideas very good. Language ability above the average, but not so good as other abilities.
13. Girl. Age 9-8. M.A. 13-5. I.Q. 137.1. Intelligence—very superior.
Has very evenly developed 12-year intelligence. Goes above that age in ability to see relationships between ideas. Does particularly well in thinking about concrete objects not present to the senses.
14. Girl. Age 8-7. M.A. 11-8. I.Q. 124.3. Intelligence—very superior.
Vocabulary poor. Memory very good, about that of a 14- or 15-year-old. Ability to see relationships between ideas excellent, about that of a 12-year-old.
15. Girl. Age 9-2. M.A. 11-3. I.Q. 122.7. Intelligence—very superior.
Intelligence in general that of a 10-year-old. Goes beyond that in language ability, vocabulary and memory, in all of which she reaches the 12-year standard. In ability to see relationships between ideas she does not do nearly as well. Ability distinctly specialized, in the direction of language.
16. Girl. Age 9-0. M.A. 10-10. I.Q. 120.0. Intelligence—superior.
Has evenly developed 10-year intelligence. Is better than that in ability to see the relationships between ideas; there she reaches the 12-year standard. Seems to be rather slow in her thinking and her attention wanders a great deal. One of the least efficient, in general attitude, of any of the 120 I.Q. children tested. Did not do at all well in the group tests.
17. Boy. Age 8-4. M.A. 11-0. I.Q. 120.0. Intelligence—superior.
Memory good,—up to 12-year standard. General comprehension not especially good. Language ability good.
18. Girl. Age 8-11. M.A. 11-8. I.Q. 119.6. Intelligence—superior.
Ability to see relationships between ideas very good, especially the ability to think about concrete situations. Vocabulary very good. General language ability not so good.

THE EQUIPMENT OF THE SPECIAL CLASS-ROOM

During the first few weeks of its existence, the Special class met in the small room in School N, mentioned on page 19, but the space here proved so inadequate for the varied activities of the children, that a change was soon made and the class was given a somewhat larger room. This room was equipped with ordinary seats and desks which had seen much hard wear. One of the projects later carried on by the boys consisted in sand-papering the furniture, and giving it a fresh coat of varnish. On cloudy days, several gas-jets gave inadequate light. The windows looked out onto a busy street, where many street-cars and automobiles passed; when they were open, the room was often too noisy for efficient work.

A bulletin board was kept well filled with clippings which the children had found of such interest that they wished to share them with others. A table in one corner of the room served as a library, and was always heaped high with books and magazines. Most of these were brought from home by the children, while a few books of reference were provided by the school. Books from the university library were often added by the teacher or the psychologist, to throw light on some special topic.

THE TEACHER OF THE SPECIAL CLASS

When the Special class was organized it seemed necessary, as a matter of school policy, to select the teacher of the class from among the women at that time teaching in N School. Miss C. who was selected to teach the Special class had been teaching first grade. There her kindness, patience and tact had made her very successful. She was a graduate of the Columbus Normal School, and had been a teacher for about ten years. At the time she took charge of the Special class she was attending afternoon classes at the University and in August 1919, she completed the work for the A.B. degree, with a major in English. She had read widely and intelligently, and had a large fund of general information from which to answer the many questions of the gifted children.

Miss C.'s personality was delightful; she was patient, kind, but full of enthusiasm. She possessed a keen sense of humor. She never "talked down" to the children, but took them gayly into her confidence. They, in turn, loved her very much, and tried never to merit her frown of displeasure. The relationship between pupils and teacher was an unusually happy one.

Miss C.'s attitude toward the work of the class was excellent. She appreciated the experimental nature of the work to be done, she was interested in trying out new types of teaching and gave very intelligent coöperation to the plans of the principal and the psychologist. She gave herself very completely to making the class a success, and most of her interests and joys centered about the gifted children. During the year and a half she taught the class she was registered in courses in educational psychology at the University.

Although it is unlikely that a more ideal teacher for a gifted class could have been found in the city of Columbus, a few possible negative criticisms may be suggested. The principal sometimes said she thought Miss C. talked too much, instead of giving the children opportunities to talk. The author felt that Miss C.'s lack of experience with the subject matter of Grades 5, 6 and 7 caused her to cling too closely to the ordinary curriculum for these grades. Certain mistakes which were made in the conduct of the class should not be counted against Miss C., since they were the result of trying to put into practice principles which were at that time accepted by teacher, principal and psychologist. These mistakes will be discussed in Chapters VI and IX.

In concluding this statement concerning the teacher of the class, it should be very clearly stated that a large part of the real success of the class was due to the high ability and the keen interest of Miss C.

THE PRINCIPAL OF N SCHOOL

No statement of the school environment of the Special class would be complete without a brief reference to the principal of N School, Mrs. S. She was often in the special class room, she frequently gave short talks to the children about their work, their play, or general ideals of living. The boys and girls liked her because she was so fair and good-natured in her relationships with them.

The coöperation given by Mrs. S. to the work of the class was excellent. She did all she could to bring it to a successful completion. The only criticism that the author could make of her attitude is the following: she was very eager to have the children do good work when they left the Special class, and entered the Junior High. Looking toward this end, she encouraged the teacher to follow rather closely the usual curriculum. The result was that not as

many contributions to curriculum-making for a gifted class were made, as was hoped for by the author when the class was begun.

CHANGES IN THE PERSONNEL OF THE CLASS

The class for gifted children as organized in January, 1919, continued in session, with some changes in personnel, until June, 1920, at which time the pupils then in the group were promoted to Grade 8B. A brief history of the personnel changes follows: When school opened in September, 1919, four of the original eighteen children failed to return to the class. Number 4 and No. 10 had moved out of the city. No. 14 was ill, with a chronic disease, and was not in school at all. She had suffered from this disease for several years, and an attack of influenza in the spring of 1919 had intensified it. There was no feeling on the part of either her parents or her teacher that the work she did in the Special class injured her health any more than work in the regular class room would have done. No. 1 had moved into another district, so far away from N School, that he would have had to walk over two miles to reach the Special class. His parents, therefore, sent him to the nearest school,—but he was so unhappy there, that his mother finally permitted him to return to N School, in November, 1919.¹

To take the places of the four who had left the class, five more children were added in September, 1919. These additions were made before the author returned to the city, and with one exception, were selected entirely on the basis of the principal's and teacher's estimates of ability. These children were chosen from Grade 6A, because the Special class was just beginning 6A work at this time. The boy who became No. 22 in the Special class had been in Grade 4A in March, 1918. His I.Q. at this time was 121, a record which would naturally have placed him in the Special class in January, 1919. However, in September, 1919, he had been given an extra promotion, into Grade 5A. He thus fell outside the grade limits of the Special class. But, by the principal's decision, he entered this class in September, 1919. One may speculate as to whether he gained more by the procedure: one-half grade skipped plus one year in ordinary class room, than he would have gained from the procedure: one and one-half grades' work covered in the Special class.

¹ For a more detailed account of this experience, see p. 163.

These five additions to the class were given Binet tests in September, 1919; the results are shown in Table IV. No. 23 had come from another school. No. 19, 20 and 21 had been in N School for several years, and are of special interest because they had been in a class for bright children during the year 1917-18. The selection of children for this class had been made on the basis of teacher judgment. During the year of 1917-18 they covered the work of Grades IVB, IVA and VB. This group had been tested with the Omnibus test in March, 1918, and the Omnibus scores for these three children are shown in Table IV. Since these are all above the median score for 5A (as found in School K), at this time one could have predicted that these children would continue to do unusually good school work.

The data in Table IV show that these five children could qualify, by I.Q., for the Special class,—with the one exception of No. 19, who gained an I.Q. of only 107. This child's score in the Omnibus test, a subsequent I.Q. of 121, and her work in the Special class, indicate that the I.Q. of 107 is probably too low.

TABLE IV

BINET TEST RESULTS OF 5 CHILDREN ADDED TO SPECIAL CLASS IN SEPTEMBER 1919

Iden. Number	Chron. Age	Mental Age	I.Q.	Omnibus Test Score
19.....	11-7	12- 5	107.2	136
20.....	11-0	16- 6	150.0	211
21.....	11-8	15- 6	132.9	125
22.....	12-3	14- 4	117.0	...
23.....	10-6	14-11	142.1	...

Four of these five children continued in the Special class until it left N School in June, 1920. No. 21 left the class in February, 1920, to enter the 7B class in C School, a junior high school. His most intimate friends in N School were leaving to enter C School, and he felt that he could not be separated from so many of the members of the football team, of which he was captain.

If we consider that the Special class was in session four semesters,¹ the attendance in the class was, approximately, as follows: 4 semesters, 15 children; 2 semesters, 7 children; 1 semester, 1 child.

¹ The first semester was the incomplete one of the fall and winter of 1918-19.

It is impossible to estimate what effect these changes in personnel had on the work of the class. The children who leave the class are missed very much. Those who enter a class after it has been in session two semesters must be told many of the special things the class has already done. This may give to the other children a desirable opportunity for review and the interest and enthusiasm of the new members is a stimulus to greater activity. It is probable that most Special classes which continue for more than a year will have to meet such changes in personnel, and teacher and children must view them in the most constructive way possible.

The following chapters will be concerned with a detailed study of the mentality and achievements of these 23 gifted children. We shall first consider the results of the educational tests given them.

CHAPTER III

THE ACHIEVEMENTS OF THE SPECIAL CLASS IN EDUCATIONAL TESTS

THE writer followed the progress of the gifted class through Grades 5, 6 and 7, by the use of a comprehensive series of educational tests. Practically the same group of tests was given to the class at three different periods: February 1919, June 1919, and June 1920. In many of these tests it was possible to compare the results from the Special class with established grade norms, and thus determine whether the bright children were accelerated. But a further comparison was made possible by the use of a Control group to whom most of the educational tests were administered at the same intervals as were used for the Special group.

CONTROL GROUP

The thirty-eight children chosen for use as a Control group were, in February 1919, completing the work of 5B, the grade from which children 1 to 11 had come into the Special class. They formed the class in N School which was most like the one children 1 to 11 would have been in, had they not been placed in the Special class.

Binet tests were given to 28 members of the Control group at varying times over a period of two years. The results of these are shown in Table V.¹

Attention should be centered on the I.Q.'s rather than on the mental ages. Statements of failures in promotion and extra promotions are added to Table V to facilitate comparison of school progress and I.Q. The central tendency of the I.Q.'s is lower than an average class in the neighborhood of N School should show. If, however, the I.Q.'s of the seven children who were moved from this group to the Special class are added to these 28, the median I.Q. for the 35 children becomes 101, and the average, 102.7. We

¹ Only six of these tests were given by the author. Thirteen were given by teachers in N School whom the author was training in the administering of the Binet tests. The remaining nine were given by students in mental testing, under the direction of Professor R. Pintner, to whom the author is indebted for the data in these nine cases.

TABLE V
BINET TEST SCORES OF CONTROL GROUP

Iden. Number	Chron. Age	M.A.	I.Q.	School Progress
1.....	11- 8	12- 0	102.8	
2.....	11- 4	12-11	114.0	Extra promotion, 5A-6A.
3.....	12- 0	12- 6	104.1	
4.....	12- 7	10- 2	80.8	
5.....	11- 2	11- 9	105.0	
6.....				Moved away.
7.....				
8.....	11- 7	11- 4	97.9	
9.....				Moved away.
10.....	12- 4	11- 4	92	Not promoted, February 1919.
11.....	11- 3	10- 6	93	
12.....				Not promoted, February 1919.
13.....	12-11	10- 0	77.4	
14.....	11-10	10- 3	87	Not promoted, February 1919.
15.....	12-10	9- 3	72	Not promoted, February 1919.
16.....	10- 5	12- 2	116.8	Extra promotion, 5A-6A.
17.....	12- 3	10- 5	85	
18.....	12- 7	15- 4	121.8*	
19.....				Moved away.
20.....	11- 8	10- 4	88.0	
21.....				Moved away.
22.....	11-11	10- 9	90.0	Not promoted, June 1919.
23.....	11- 9	12- 7	107.1	Extra promotion, 5A-6A.
24.....	12- 4	11- 3	91	Not promoted, June 1919.
25.....	12- 3	10-10	88	Not promoted, February 1919.
26.....	11- 2	10- 6	94	Not promoted, February 1919.
27.....	11- 8	11-11	102	
28.....	13- 3	9- 7	72	Not promoted, February 1919.
29.....	11- 7	10- 8	92	
30.....				Extra promotion, 5A-6A.
31.....				Extra promotion, 5A-6A.
32.....	11- 7	13- 6	116.6	
33.....	12- 3	12- 8	103.4	
34.....	12- 1	10- 9	88.9	
35.....	11-10	11-10	100	
36.....				Moved away.
37.....	9- 0	10- 5	115.7	Extra promotion, 5A-6A.
39.....				Extra promotion, 5A-6A.
Median I.Q. ....93.5				Average I.Q. ....96.4

* No. 18 had been tested by the author in the spring of 1918, with a resulting I.Q. of only 101. This I.Q. of 121.8 (a result of a student's test) may be somewhat too high.

shall therefore be correct in thinking of the Control group as an "average" class from which seven of the brightest children have been removed.

The facts in the last column of Table V show that only 16 children of the original 38 remained in the same grade in N School until June 1920. Nine of these were under one teacher, and seven under another during the last semester that the Special class was in session, but the two groups were combined for testing purposes. The original Control group had received 11 additions, four of these through failures, and 4 by double promotions. In June 1919, the scores of the additions to the class were not included in the comparison with the Special class. But by June 1920, the Control group had grown so small that the children who had been added to it were included in the tabulations.¹

LIST OF EDUCATIONAL TESTS GIVEN TO THE SPECIAL AND
CONTROL GROUPS

The tests used in the comparison of the Special and Control groups covered parts of the fields of arithmetic, reading, spelling, language and geography. A test of logical memory was also included in these groups. Tests of ability to judge historical facts were given to the Special class only. The following were used one or more times: (1) *Arithmetic*. Woody² Series A, 4 fundamentals; Bonser³ Reasoning Tests I and II; Stone⁴ Arithmetical Reasoning Test. (2) *Reading*. Thorndike⁵ Visual Vocabulary; Thorndike⁶ Understanding of Sentences, Alpha I and II. (3) *Spelling*. Ayres⁷ Lists U and V. (4) *Language*. Completion, Kelley's⁸ arrangement of Trabue's completion exercises. Compositions graded by the Nassau County Scale.⁹ (5) *Geography*.

¹ In the tables of test results the original 38 children will be referred to as Control¹, or C.; the children who were left in this group in June 1919, as Corrected Control, or C.C.; and the 16 Control children, plus additions, who formed a 6A class in June 1920, as Control Plus, or C.P.

² Woody, C., *Measurement of Some Achievements in Arithmetic*.

³ Bonser, F., *The Reasoning Ability of Children*.

⁴ Stone, C. W., *Arithmetical Abilities and Some Factors Determining Them*.

⁵ Thorndike, E. L., "Measurement of Achievement in Reading: Word Knowledge," *Teachers College Record*, 17: 1916, 430-54.

⁶ Thorndike, E. L., "An Improved Scale for Measuring Ability in Reading," *Teachers College Record*, 16: 1915, No. 5, 31-53.

⁷ Ayres, L. P., *A Measuring Scale for Ability in Spelling*.

⁸ Kelley, T. L., "Individual Testing with Completion Test Exercises," *Teachers College Record*, 18: 1917, 371-82.

⁹ Trabue, M. R., "Supplementing the Hillegas Scale," *Teachers College Record*, 18: 1917, 51-84.

Hahn-Lackey¹ Geography Scale, Lists O, N, P, R. (6) *Memory*, immediate and deferred, of the "Marble Statue."² (7) *History*. Van Wagenen's³ Thought Scales and Character Judgment Scales.

The dates on which the various tests were given to the groups are shown in Table VI. The tests were usually administered to the Special group during the first half hour of the afternoon session of school, and to the Control group during the second half hour. A few days after each test was given, the psychologist reported to each class the names of its members who had made the three or four highest scores.

TABLE VI
DATES OF ADMINISTERING EDUCATIONAL TESTS

Test	Special			Control		
	Feb. 1919	June 1919	June 1920	Feb. 1919	June 1919	June 1920
Woody Addition.....	Feb. 10	May 27	May 17	Feb. 11	May 27	May 17
" Subtraction.....	Feb. 11	May 28	May 18	Feb. 12	May 28	May 18
" Multiplication...	Feb. 12	May 29	May 19	Feb. 13	June 2	May 19
" Division.....	Feb. 13	June 3	May 20	Feb. 14	June 3	May 20
Bonser Reasoning I....	Mar. 19	June 17	June 3	Mar. 4	June 17	June 3
" " II.....	Mar.	June 18	June 7	Mar. 5	June 18	June 7
Stone Arith. Reas.....		June 18	June 3		June 18	June 3
Thorndike Vocabulary...	Feb. 24	June 18	May 28	Feb. 25	June 17	May 28
Thorndike Alpha I.....	Feb. 18	June 11		Feb. 19	June 13	
" " II.....	Feb. 14	June 11	June 8	Feb. 17	June 11	June 8
Ayres Spelling U.....	Feb. 25	June 5	May 25	Feb. 26	June 5	May 26
" " V.....			May 25			May 26
Composition I.....	Feb. 21	June 9	June 2	Feb. 24	June 9	June 2
" II.....	Feb. 28	June 16	June 10	Mar. 3	June 16	June 10
Completion Alpha.....	Feb. 19		May 21	Feb. 20		May 21
" Beta.....		June 12			June 13	
Geography List N.....			June 9			June 9
" " O.....			May 24			May 24
" " P.....	Feb. 20	June 4		Feb. 21	June 4	
" " R.....	Feb. 26	June 13		Feb. 27	June 13	
Memory Immediate.....	Feb. 27			Feb. 28		
" Deferred.....	Mar. 13			Mar. 14		
Van Wagenen History:						
Thought A.....	Mar. 25		June 7			
" B.....		Oct. 3 & 6				
Character L.....	Apr. 2	Oct. 7	June 11			

¹ Hahn-Lackey Geography Scale. Published by Wayne State Normal School, Wayne, Nebraska.

² Whipple, G. M., *Manual of Physical and Mental Tests*, II: 208.

³ Van Wagenen, M. J., *Historical Information and Judgment in Pupils of the Elementary School*.

ADMINISTERING AND SCORING OF TESTS

All tests were administered and scored according to the methods given in the references quoted on pages 31 and 32. Some additional facts about some of the test procedure and scoring are given below:

1. *Woody Arithmetic*. Scored by number correctly solved in 20 minutes. The results were also computed by Woody's class-score method, but the resulting data are not included here.

2. *Bonser Reasoning Tests I and II*. In Bonser's use of these problems he gave each half of each test separately and stopped the work of the whole class as soon as one child had finished. He does not tell what time-limits were used. The times used in the present study were some which had been used with 5th grade children in Illinois:¹ Test I-A, 108 seconds; Test I-B, 94 seconds; Test II-A, 107 seconds; Test II-B, 64 seconds. In the tests of February 1919 these times seemed very short, but in those of June 1920 some children finished before time was called. Bonser's method of scoring was used, and the scores of I and II were added to make the final score.

3. *Stone Reasoning Arithmetic*. A time limit of 15 minutes was used.

4. *Thorndike Visual Vocabulary*. The first and third tests were made from the x steps, and the second test from the y steps, in such a way that the three tests were equal in difficulty. The material used in June 1920 did not contain difficult enough material to fully measure the ability of the Special class.

5. *Thorndike Alpha Reading*. Part I comprises values 4.00 to 7.00 inclusive; Part II, values 7.00 to 9.00 inclusive. In February 1919, Part II was unfortunately given first, and was found too difficult for the Control group. Part I was then given, and the score computed from the results of the two parts. It is quite probable that some of the children would have made a higher score on Part II if they had previously answered the easier questions of Part I. In June 1919, the same order was followed, but in this case the reversal of tests probably did not interfere seriously with the pupil's achievement. In June 1920, Part II only was used.

6. *Ayres' Spelling*. In June 1920 List V was used to supplement List U, in order to provide some words so difficult that no child could spell them. It failed to serve this purpose, since three chil-

¹ Whipple, *Classes for Gifted Children*, 58-59.

TABLE VII

AVERAGE AND MEDIAN SCORES IN EDUCATIONAL TESTS FOR SPECIAL AND CONTROL CLASSES AT THREE TESTING PERIODS

Test	Special			Control			Method Used in Computing Central Tendency	
	Feb. 1919	June 1919	June 1920	Feb. C.	June C.C.	June C.P.		
Addition.....	28.3	32.9	32.8	19.7	22.5	25.5	Median No. Correctly Solved	"
	26.6	30.8	30.2	19.6	22.7	24.4	Average	"
Subtraction.....	23.3	28.8	30.3	20.9	23.5	24.2	Median	"
	23.1	27.2	29.2	20.0	22.9	23.7	Average	"
Multiplication.....	20.2	28.3	31.8	16.3	19.5	21.7	Median	"
	19.3	27.6	29.5	16.3	19.2	20.9	Average	"
Division.....	20.3	25.9	28.7	15.2	18.2	21.5	Median	"
	19.3	25.7	27.5	16.0	19.0	20.4	Average	"
Bonsen Reasoning*	11.2	14.8	18.5	5.3†	8.5	8.2	Median Score by Bonsen Method	"
	11.5	15.6	18.5	4.5†	8.2	8.3	Average	"
Stone Arith. Reasoning.....	....	5.0	7.3	....	3.5	4.1	Median Score by Stone Method	"
	....	5.45	7.64	....	3.14	3.98	Average	"
Visual Vocabulary.....	6.68	7.39	9.02	4.54	4.85	6.0	Class Score by Thorndike Method	"
Alpha Reading.....	6.06	6.99	7.55	5.49	5.70	6.94	"	"
Spell. List U.....	47.2	65.1	75.6	20.4	29.6	62.0	Average Per Cent Spelled Correctly	"
	52.3	66.3	82.7	20.5	24.5	64.7	Median	"
Spell. List V.....	....	....	75.0	....	....	60.4	Average	"
	....	....	86.7	....	....	67.5	Median	"

* See Table VI for exact date on which this test was given.

† There figures are for corrected Control.

TABLE VII—Continued

Composition I.....	47.5	46.5	53.3	38.0	43.5	43.7	Median Average	Score by Nassau Scale " " " "
Composition II.....	47.1	46.9	52.7	39.6	43.3	43.7	Median Average	" " " "
	48.5	50.5	54.5	36.4	41.8	43.8	Median Average	" " " "
	48.2	49.3	53.4	39.0	40.7	45.8	Median Average	" " " "
Completion.....	7.45	7.80	8.75	6.15	6.33	7.5	Median Average	Score by Kelley Method " " " "
	7.49	7.91	8.62	5.93	6.17	7.36	Median Average	" " " "
Geog. List P.....	53.6	70.5	.....	22.2	36.0	.....	Average Median	Per Cent Correct " " " "
Geog. List R.....	50.0	74.9	.....	19.5	34.3	.....	Average Median	" " " "
Geog. List N.....	80.6	81.5	.....	59.8	76.3	.....	Average Median	" " " "
	80.5	83.5	.....	55.5	75.0	.....	Average Median	" " " "
	.....	.....	55.0	.....	.....	44.2	Average Median	" " " "
Geog. List O.....	.....	.....	56.5	.....	.....	49.0	Average Median	" " " "
	.....	.....	71.0	.....	.....	57.4	Average Median	" " " "
	.....	.....	72.3	.....	.....	55.1	Average Median	" " " "
Immediate Memory.....	38.8	.....	.....	29.6	.....	.....	Average Median	No. "ideas" remembered " " " "
	42.5	.....	.....	30.5	.....	.....	Average Median	" " " "
Deferred Memory.....	33.9	.....	.....	23.4	.....	.....	Average Median	" " " "
	33.5	.....	.....	23.5	.....	.....	Average Median	" " " "
Hist. Thought.....	9.2	15.0	20.25	.....	.....	.....	Median Average	Score by Van Wagenen Method " " " "
	10.0	13.9	19.0	.....	.....	.....	Median Average	" " " "
Hist. Char. Judg.....	5.85	7.15	8.0	.....	.....	.....	Median Average	" " " "
	6.28	7.34	8.25	.....	.....	.....	Median Average	" " " "

dren in the Special and two in the Control made perfect scores. But no child made a perfect score on List U at this time.

7. *Composition.* The method of obtaining and scoring the compositions used will be reported in Section III of Chapter V.

8. *Geography.* Ten questions used from List R; 16 from P; 12 from N; 12 from O. In each list half the questions used were what the scale classes as "memory" questions; the other half were "thought" questions.

9. *Logical Memory.* The passage was read aloud to the children, who wrote down all they could remember of it; two weeks later they wrote all they could then remember.

RESULTS OF TESTS. GRADE ACHIEVEMENT

The central tendencies of both groups were computed in all tests for each of the three testing periods. The results are shown in Table VII, the last column of which indicates the method of computing central tendency. The pupils included in the Special class results vary from time to time as reported in Section VI of Chapter II. Those for the Control vary as indicated on pages 29 and 31. In the February, 1919 tests, central tendencies for the Corrected Control (not shown in Table VII) are slightly higher than those shown for the Control. In the June, 1920 tests, central tendencies for the Corrected Control (not shown) are practically the same as those shown for the Control Plus.

On the basis of the data of Table VII it would be possible to make a large number of Special-Control comparisons. But the results of such a comparison would tend to be a confusing mass of figures, from which it would be difficult to formulate any clear conclusions. It seems to the author more significant to compare the two groups on the basis of grades and months of achievement, computed in terms of achievement norms. The norms used in making these computations are shown in Table VIII, which also indicates the type of central tendency used, and the time of year the norms were obtained. If the publisher of a set of norms does not indicate the time of year, it is assumed that the norms were obtained in January. The sources of the norms in Table VIII are as follows:

Fundamentals of Arithmetic. Woody, C., *The Woody Arithmetic Scales: How to Use Them.*

Stone Arithmetical Reasoning. Monroe, W. S., *Educational Tests and Measure-*

ments, p. 44, Table VI. Thoroughly satisfactory norms for this test are not available. The data in Monroe give the results found in surveys of three school systems. There is much variation from system to system, and no one can well be used as a norm. An average for the three scores for each grade have been used, although such an average may be far from the real ability of some grades. A month interval of .15 was assumed from Grade 4 to Grade 5, because data for Grade 4 are not given in this table.

Visual Vocabulary. The norms used were some which had been compiled by W. A. McCall, from various sources. A month interval of .06 was assumed from Grade 8 to Grade 9.

Alpha Reading. Norms compiled by McCall.

Spelling. Ayres, L. P., *A Measuring Scale for Ability in Spelling*. Buckingham extension of the Ayres spelling scale.

Composition. Trabue, R. M., "Supplementing the Hillegas Scale," *Teachers College Record*, 18: 1917, p. 79.

Completion. Kelley, T. L., "Individual Testing with Completion Test Exercises," *Teachers College Record*, 18: 1917, p. 381. Assumed these to be January norms. If, as seems possible, they are June norms, our grade achievements are all 4 months lower than they should be.

Geography. From the norms on the Hahn-Lackey Scale.

Memory. Whipple, G. M., *Manual of Physical and Mental Tests*, II, p. 577. Norms by ages from 8 years to 18 years for boys and girls separately. Our cases are too few to profit by separation of boys and girls. We, therefore, averaged the sex norms given by Whipple, and used these averages.

History. Van Wagenen, M. J., *Historical Information and Judgment*. Norms for Thought Scales A and B are given for the two tests combined, but since the two scales are practically equal in difficulty we used *half* of the norms for A and B combined, as norms for each test separately. This procedure was necessary because we did not give both A and B at any single testing period. Any error in norms thus introduced is certainly small. From Grade 8 to Grade 9, it was necessary to assume a month-interval: 0.4 for the Thought Scales and 0.2 for the Character Judgment Scale.

The method of computing grade-month achievement is this. If the third grade norm in addition is 15.1, and the fourth grade norm is 18.9, we may think of the intervening 3.8 units as the results of 10 months of school work. The gain per month at this time, therefore, averages .38 units. Suppose a class scores 15.5; it is approximately one month beyond the Grade 3 norm. If it later scores 18.0, it is 9 months beyond that norm. If we wish to measure improvement we may say the class has improved 8 months. It is thus possible to state the central tendency of a class in a given test as so many months beyond the norm for such and such a grade. A grade-month achievement of 5 months beyond the norm for Grade 6 will be written as 6-5.

From the data in Table VIII tables of *improvements by months*

TABLE VIII

NORMS USED IN CONSTRUCTING TABLES OF GRADE-MONTH ACHIEVEMENT

Test	School Grades							
	III	IV	V	VI	VII	VIII	IX	
Addition.....	15.1	18.9	22.9	29.3	32.0	33.4		} January (?) Median Number Correct in 20 minutes
Subtraction.....	13.0	16.5	20.9	25.3	28.5	30.8		
Multiplication.....	7.2	12.4	19.9	26.9	29.5	33.3		
Division.....	7.2	11.3	18.3	25.1	27.2	29.2		
Stone Reas. Arith.	(2.5)*	4.00	5.17	7.07	7.57			} January (?) Medians May Class Scores by Thorndike Method May Class Scores
Thorndike Vocab.....	4.71	5.99	6.78	7.84	8.44	(9.04)*		
Thorndike Read....	3.99	5.67	5.98	6.98	7.27	7.67		
Ayres Spelling:								} January Averages
List U.....	12	27	42	58	73	84	92	
List V.....				50	66	79		
Compositions.....	35	40	45	50	55	60		} June Medians January (?) Medians
Trabue Compl.....	6.0	6.7	7.1	7.4	7.8	8.5		
Hahn-Lackey:								} May Averages
Geog.—N.....	21	34	42	58	58			
Geog.—O.....	27	42	50	66	66			
Geog.—P.....	34	50	58	73	73			
Geog.—R.....	50	66	73	84	84			
Van Wagenen								} May (?) Medians
History:								
Tho't Scale A								
and B.....			4.95	10.35	14.00	18.1	(22)*	
Character Scale								
L.....			2.4	4.4	5.7	7.7	(9.7)*	

MARBLE STATUE MEMORY TEST—NORMS BY AGES

Age.....	8	9	10	11	12	13	14	15	16	17	18
Immediate Memory.....	26.4	29.8	31.8	34.7	36.6	37.6	37.6	37.8	35.9	35.6	37.4

* Inferred from the adjacent norms.

were drawn up, for each test. The scores of Table VII were then compared with these tables, to ascertain the grade-month achievement of each. If the norms for a given test are averages, the average scores for that test, in Table VII, were used for obtaining grade-month achievement. If the norms are medians, the median scores were used. In finding these achievements we encountered this difficulty: in some cases we compared a score made in June

with January norms, etc. The difference between the first part of June and the last part of January was considered as four months. Therefore in making comparisons with the tables of norms by months, it seems fair to compare June scores with a point 4 months beyond the January norm. This, for all practical purposes, converts the January norm into a June norm. For instance, the June 1920 score in addition for the Special group is 32.6. If this had been a January score it would have reached the norm for 7-6, i.e., 6 months beyond the norm for Grade 7. But by June the class had had four months more training than a January group; therefore, we count backwards 4 months, to obtain the grade-month achievement for the June test, i.e., 7-2.

By the foregoing method all the grade-month achievements obtained by converting the data in Table VII have been "corrected" to represent June achievement.¹ The resulting grade-month achievements are shown in Table IX. This states very clearly the achievement of each group, at each of the three testing periods. For a given date, it tells us in what tests a class did well and in what ones they did poorly. The June 1920 column is especially important because it shows where each group scored when they left N School. At this time the Special class, who had just completed the work of Grade 7, should have reached the norms for 7-0, while the Control who had just completed Grade 6 should have reached 6-0. In the 9th and 10th columns of this table, acceleration and retardation with respect to these desired scores are given. Here the four arithmetic tests have been combined in one score, to represent ability in the four fundamentals; the two spelling tests, the two composition tests, the two geography tests and the two history tests have been similarly combined. The particular combinations made are arbitrary, and if a reader feels that other grouping of tests would be better, he can easily make these from the data given.

¹ It would at first seem that when January norms are used, February scores should not be corrected as much as June scores. This procedure is satisfactory until we later come to make statements of improvement by subtracting grade-month achievement for February 1919 from that for June 1920. A class may have actually improved 12 months. But if one set of scores has been "corrected" to June and the other to February, the actual achievement may seem only 8 months. Since we have two June scores and only one February score, and since we are somewhat more concerned with where a class scored in June 1920 than in February 1919, we have "corrected" all scores to approximate June norms.

TABLE IX
GRADE-MONTH ACHIEVEMENT IN EDUCATIONAL TESTS AT THREE TESTING-PERIODS
ACCELERATION AND RETARDATION IN JUNE 1920

	Special Class			Control Class			Retardation (-) or Accel- eration (+) in Months,		Limits of +1 and -1 Sigma, for tests of					
	June '19		June 1920	C. C. C. P.		June '20		June '20						
	All	All	Upper	Lower	Feb. '19	June '19	June '20	Special	Control					
			I.Q.*	I.Q.†				Special <td>Control</td>	Control					
Addition.....	5-5	7-2	7-2	6-6	6-1	3-8	4-4	5-0	6-3 to 8-2	4-9 to 5-1				
Subtraction.....	5-1	6-8	7-3	7-4	6-0	4-6	5-2	5-3	7-3	7-9	5-2	5-5		
Multiplication.....	4-7	6-1	7-2	6-7	6-8	4-1	4-6	4-9	6-9	7-5	4-7	5-0		
Division.....	4-9	6-0	7-4	7-3	6-3	4-2	4-6	5-1	6-8	7-9	4-9	5-2		
Stone Arith. Reasoning.....	...	5-4	7-1	7-1	8-8	...	4-2	4-6	1	14	4-5	4-9		
Visual Vocabulary.....	5-9	6-6	9-0	8-6	8-3	3-8	4-2	5-0	20	10	...	...
Alpha Reading.....	5-1	6-0	7-7	8-8	7-5	3-9	4-1	6-0	7	0	...	...
Spelling:														
List U.....	4-9	6-1	6-8	7-4	6-5	3-2	3-8	5-9	0.5	0.5	6-5	7-2	5-5	6-2
List V.....	...	...	7-3	...	...	...	...	6-2	...	...	6-9	7-7	5-9	6-6
Composition Av. of 1 and 2.....	6-6	6-2	7-7.5	8-0	7-9	4-4.5	5-5.5	5-7.5	7.5	2.5	7-3	8-1	5-3	6-1
Completion.....	6-7	7-6	9-2	9-4	9-1	3-8	4-1	6-9	22	9	8-6	9-9	6-3	7-4
Geog. List R.....	5-5	6-8	...	...	...	3-1	4-1	...	...	...	6-6	7-1	5-8	6-4
" " P.....	6-7	6-8	...	...	...	4-6	6-3	...	...	...	8-1	8-5	6-3	6-6
" " N.....	...	...	6-8	...	7-5	...	...	6-1	1	3	...	...	...	...
" " O.....	...	...	7-4	7-8	...	...	...	6-5	...	...	...	...	...	...
History:														
Thought.....	5-8	7-2	8-6	8-5	8-4	...	...	...	13.5	...	8-3	8-8	...	...
Char. J.....	7-1	7-7	8-1	8-7	8-0	...	...	...	...	...	7-9	8-4	...	...
Average.....									8.36	2.84				
Median.....									7.25	1.25				
Range.....									.5 to 22	-14 to +9				

* By the 1919 Binet Tests, Nos. 1, 2, 8, 12, 13, 15, 17, 20, 23.

† By the 1919 Binet Tests, Nos. 3, 5, 7, 9, 11, 16, 18, 19, 22.

We find that the Special class are retarded in no tests; in five out of nine tests they are more than half a year accelerated. The average acceleration for this group is 8 months. As far as test results indicate these Special class children, at the time of leaving Grade 7, were doing thoroughly satisfactory work. It should be remembered in this connection that the average chronological age of the class is $2\frac{1}{2}$ to 3 years younger than the average for this grade.

The Control class are retarded in four out of eight tests; the average retardation is about three months, the median, 1.25. While this average shows only a slight retardation, the condition of the group cannot be considered satisfactory because of their great retardation in such tests as arithmetical reasoning and fundamentals, and visual vocabulary. The total difference in achievement between the Special and Control groups is 21 months. The answer to the question, how nearly do these results represent the real differences between the two groups, can only be guessed at, although subsequent chapters may throw some light on it. The facts as to June 1920 achievement for both groups are shown graphically in Diagram 1.

The fourth and fifth columns of figures in Table IX show the June 1920 grade-month achievements for the upper and lower I.Q. halves of the Special class. This will indicate whether, within this small selected group, highest intelligence is correlated with highest achievement. When these results are grouped according to the scheme indicated in the ninth and tenth columns of this table, we find that the average achievements for the two halves are 8-1 and 7-8, the medians are 8-0 and 7-9,—a very small difference. There are, however, large differences on certain tests. In reading and spelling the upper half does much better than the lower half. In one test, arithmetical reasoning, the lower half does better than the upper, a situation which is the opposite of what one would expect. Two or three children whose I.Q.'s fell near the top of the lower half made very good records on this test. Since the median mental age of the upper half is 15-10, and that of the lower half 14-3, the achievement difference found is not as great as might be expected.

It is evident that the correctness of the above conclusions as to achievement will depend in part on the accuracy of the norms used. In few of these tests have thoroughly satisfactory grade norms been determined. The effect of poor norms may be vividly illustrated

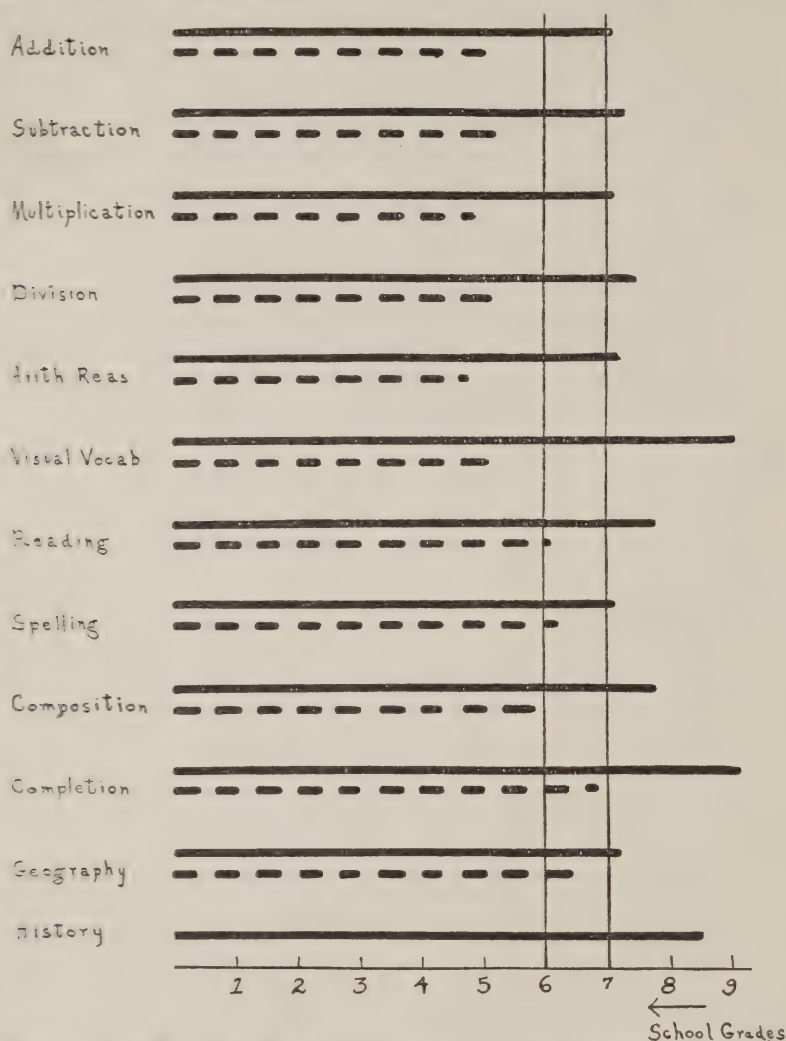


DIAGRAM 1. The June 1920 Achievement in Educational Tests of the Special Class (solid lines) and the Control Class (broken lines). All Special scores should reach the light line at Grade 7; all Control scores, that at Grade 6.

by our experience with the Woody arithmetic tests. Before Woody's new booklet with its new norms was published, our data for his tests had been compared with the old norms (in his *Measurements of Some Achievements in Arithmetic*). When the new norms appeared the data were compared with them and these results used,

since the new norms are presumably more accurate than the old. In months of acceleration or retardation, June 1920, for the four fundamentals combined, the results for the Special class were -5 , by the old norms, and $+11$ by the new; for the Control, -40 for the old, and -37 by the new. The using of the new norms rather than the old has improved the Special class record a great deal, and the Control record a little. This difference in effect on the two groups is due to the fact that the old norms tended to be too high in the upper grades, and were approximately correct in the middle grades. It is evident that all of our grade-month achievements may have thus suffered from the use of inaccurate norms. If the norms are consistently too high or too low through all the grades the effect in our Special and Control comparisons will not be so serious. On the other hand, variation in accuracy from grade to grade may greatly reduce the usefulness of the comparisons. The author does not venture to state which of the tests used have the most accurate norms; those for the Stone Reasoning tests are perhaps the most inaccurate.

It is possible to study improvement by means of the data in Table IX. If we do this, however, we are comparing June 1920 and February 1919 scores which were not obtained from exactly the same group of children. A critic might ask, "If the records were used for only those children who were present in both tests might not the results be quite different?" In Section I of Chapter V improvements based on such records will be given, and this problem will be discussed.

The reliabilities of some of the averages and medians in Table VII have been calculated, by the formulae $\sigma t. - \text{obt. av.} = \frac{\sigma \text{dis.}}{\sqrt{n}}$ and

$$\sigma t. - \text{obt. med.} = \frac{5}{4} \cdot \frac{\sigma \text{dis.}}{\sqrt{n}}.^1 \quad \text{Where the norms for a test are aver-}$$

ages the first formula has been used; where they are medians, the second was used. These reliabilities and the S.D.'s from which they were calculated are given in Table XLVIII of the appendix. Certain data based on these reliabilities are shown in the last four columns of Table IX. The median (or average) found, plus the sigma of that median, and the median minus the sigma of that median, have been found, and these values converted into grade-

¹ Thorndike, E. L., *Mental and Social Measurements*, Chap. 12.

month achievement. Thus, if many more measures were made of Special class achievement in addition, this achievement might be found to be not 7-2, but some other score between 6-3 and 8-2. To be exact, there are about 68 chances in 100 that a median based on many measures would fall within these limits. The effect of the large number of Control pupils in increasing reliability is seen in the narrower limits for that group. As the S.D.'s in Table XLVIII show, the variability of the Special class is greater than the Control in 15 out of 38 comparisons. The difference in the I.Q. range for the two groups will probably account for this difference.

A few additional facts and suggestions about some of the tests are added below.

Bonser Arithmetical Reasoning. It is unfortunate that there are no norms with which to compare these results. Bonser's data cannot be used because he does not give the time limits used, and when the times are as short as the ones we employed, time becomes a significant factor. The only results which can at all fairly be compared with these are those obtained from the Illinois 5th graders previously mentioned. The usefulness of such a comparison is lessened because the small number of cases, 60, does not furnish reliable norms. The median achievement for these 60 5th graders was 7.7; that for 70 Illinois 6th graders was 10.5, but the times used were slightly shorter than those for the 5th grade.¹ The Special group do much better than the Illinois children both in Grades 5 and 6. The Control group, who in June 1919, were just finishing 5th grade, surpassed the Illinois 5th grade median; but in June 1920, when finishing Grade 6, they did not attain the Illinois 6th grade median.

Stone Arithmetical Reasoning. The Special class is practically as proficient in reasoning problems as in computation, but the Control is more capable in computation than in reasoning. A partial explanation of this difference may be found in the fact that School N, in the lower grades, gives very little practice in problem solution. Almost all of their arithmetic is computation with abstract numbers. The Control group had perhaps less experience with problem solution than the ordinary class of that grade. The Special group, on the other hand, began problem solution soon

¹ Whipple, G. M., *Classes for Gifted Children*, p. 59.

after the organization of the class, and continued to do a large amount of it. Another explanation of the difference may be found in the fact that the problems of the Stone test become difficult very rapidly. The Control group might have been able to work some of the harder problems if they could have had a little guidance from a teacher, but when thrown entirely on their own resources they became confused. The Special group were used to doing independent work and were more able to guide themselves through the steps of a complicated problem.

Visual Vocabulary. A 1920 achievement of 9-0 is too low for the Special class, because the material used was not difficult enough to fully measure the limits of their ability. Their high vocabulary score may perhaps be related to the large amount of reading done by this group. (See Chap. VII.)

Alpha Reading. The Special achievement in vocabulary is 13 months higher than that in reading. In the Control class reading is 10 months higher than vocabulary. These differences may be due in part to inaccurate norms. The vocabulary test may require an amount of adaptation to the *method* and *form* of the test that may make it especially difficult for the duller Control class.

Spelling. The fact that the Control achievement in spelling was as high as 6-0.5 was undoubtedly the result of unusually definite instruction in spelling, and to an exceptional interest in learning to spell, on the part of the children. The latter was clearly the outgrowth of the good instruction. The Special class, on the other hand, very rarely had a spelling lesson, and their improvement must have come through reading, and through the spelling of words in their written lessons, such as compositions, history tests, etc.

Further evidence as to the spelling ability of the Special class is found in the scores they made on a list of 100 words, known as Jones' Spelling Demons.¹ In June 1919 the median per cent correct for 17 Special class children was 95.2. One child made a perfect score, and all but three made scores of 91 or higher. These children were able to spell almost all of these words which are frequently misspelled by the majority of children.

Composition. In such a function as composition it is extremely unlikely that the Special children were *less able* to write a good

¹ For a list of these words, compiled by N. F. Jones, see Monroe, *Educational Tests and Measurements*, p. 133.

composition in June 1919 than in February 1919. In Chapter V we shall suggest an explanation of the low score in June 1919. We shall also give reasons for thinking that in June 1920 their ability was higher than 7-7.5.

Completion. The June 1920 scores for both groups are exceptionally high. In a test which correlates as highly with intelligence as this does we might expect very high scores for the Special class, but an acceleration of 9 months for the Control is difficult to explain. Kelley gives age, as well as grade, norms for this test. When converted into age achievement, the June 1920 scores become 17-2 for the Special class, and 14-8 for the Control. The median Binet mental age at this time was 16-6 for the Special, and 11-11 years for the Control. The age by the completion test is thus shown to be 8 months higher than the Binet age for the Special, and 33 months higher for the Control. This would indicate that Kelley's age norms may be several months too high, and the same may be true of his grade norms. Lowered norms would tend to bring the Control achievement down toward the expected 6-0. We have no explanation to account for a difference of 33 months between the two mental ages for the Control group.

Geography. We find that a group may attain quite different grade-month achievement with two tests taken at the same time. In all cases the higher achievement is made on the easier test. In a subject such as geography the fact that a class had not yet studied a given topic would interfere seriously with the score obtained. In the first use of List P, the Control group failed entirely on the questions about South America, because they had not studied that country at all in their geography class. This will in part explain the low achievement of 3-1 on this test in February 1919. The 4-6 on List R probably more nearly represents the class ability. The formal and definite instruction in geography received during 1919-20 probably helped considerably in answering questions of the kind used in the scale. The result is a Control acceleration of 3 months.

History. The tests used measure the ability of the class to think and judge about historical facts; they do not measure historical information.

Memory. Since the norms in this test are age norms the comparison of scores with norms is not included in Table IX. We find that the Special average is slightly higher than the 18 year

norm, while the Control average almost reaches the 9 year norm. The highest score in the Control, 47, made by a child with an I.Q. of 117, is one point higher than the highest score in the Special. Whipple gives no norms for retention after a two weeks' interval. The Special class lost in two weeks 12.6 per cent of the initial amount remembered, and the Control lost 20.9 per cent. The Special average for immediate memory reaches the 83rd percentile, and the Control average, the 40th percentile, as obtained from 60 Illinois 5th graders who took this test.¹

SUMMARY

The facts of this chapter may be briefly summarized as follows: In June 1920 the educational achievement of the Special class was 7 or 8 months beyond the end of Grade 7, and that of the Control class was 7 or 8 months beyond the end of Grade 5.

¹ Whipple, G. M., *Classes for Gifted Children*, p. 28.

CHAPTER IV

RESULTS OF THREE APPLICATIONS OF THE BINET TEST TO THE SPECIAL CLASS CHILDREN

A QUESTION of theoretical interest, as well as of importance in the study of this special group, is that of how much the Binet Intelligence Quotients changed from year to year. The Special class children were tested in the spring of 1918, before the class was organized. They were tested a second time in the spring of 1919, and a third time in the spring of 1920. All of the testing was done by the author, with the exception of the 1919 test of child No. 2. The results of these three series of tests are given in Table X.¹

The most significant thing about the chronological ages shown in Table X lies in the fact that they are younger than those of the average child in similar school grades. If we consider 14 years, 0 months as the average age for finishing Grade 7A,² the Special class in June 1920 was, as a group, almost two and a half years younger than the average child of their school grade. We may also note the fairly wide range of chronological ages, even within the selected group.

The median mental ages for the three periods are as follows: 11-8, 13-10, 15-9.5. When completing the work of Grade 7A, these children were, on the average, *one and one-half years older mentally* than the average child who was completing this grade. In June 1920 the range in mental age was from 13-10 to 18-1.³

¹ The fact that the interval between the median chronological ages of 1918 and 1919 is 1 year 5 months may be explained as follows: the testing in 1918 began earlier in the spring and did not continue as late as in 1919. Moreover, several of the tests which have been grouped as "spring" tests were *not* given in the spring. These exceptions are as follows: the "spring" 1918 test of No. 4 was actually given on January 19, 1919. The "spring" 1919 tests of No. 15, 16, 17, 19, 20, 21, 22 and 23 were actually given in September, 1919. The grouping into tests of 1918, 1919 and 1920 might perhaps better be named, 1st series, 2nd series and 3d series. The tests of "spring 1920" were all given during May and June of 1920.

² Studies of children's progress through the elementary schools show that the "average child" is about 90 months old when he completes the first grade and that he requires 13 months, instead of 12, to do the work of each of the following grades.

³ It is evident that the mental ages of 1920 may be *too low*, since some of the children might have answered questions more difficult than any included in the Stanford Revision. This might easily be the case with children who made mental ages as high as 17-9 or 18-1.

Chronological Ages				Mental Ages			Intelligence Quotients			
Spring 1918	Spring 1919	Spring 1920	1918	1919	1920	1918	1919	1920	Average of 2 or 3 I.Q.'s	
1.....	8-0	9-2	10-2	12-6	13-1	16-3	156.3	142.7	159.8	
2.....	7-11	8-8	9-11	11-8	12-8	14-2	147.4	146.2	142.9	
3.....	9-6	10-7	11-7	12-6	13-6	16-8	131.6	127.6	143.9	
4.....	9-3	9-8	.....	12-2	15-5	.....	131.5	159.5	.....
5.....	9-10	11-1	12-1	12-9.6	14-3	15-9	130.1	128.6	130.3	
6.....	8-9	10-0	11-0	11-3	12-8	16-2	128.5	126.7	147.3	
7.....	9-8	10-9	11-7	11-10	12-11	16-4	122.4	120.2	141.0	
8.....	9-7	10-7	11-7	11-7	14-2	15-0	120.9	133.9	129.5	
9.....	9-10	10-11	11-10	11-7	12-6	15-8	117.8	114.5	132.4	
10.....	10-2	11-2	.....	11-11	14-2	.....	117.2	126.9	.....
11.....	9-10	11-0	12-0	11-2	13-3	14-3	113.6	120.5	118.8	
12.....	8-9	9-11	10-10	13-4	16-1	17-9	152.4	162.2	163.9	
13.....	9-8	10-10	11-10	13-3	15-1	16-5	137.1	139.2	138.8	
14.....	8-7	.....	.....	10-8	.....	.....	124.3	.....	.....
15.....	9-2	10-7	11-4	11-3	14-2	16-0	122.7	141.8	141.2	
16.....	9-0	10-5	11-1	10-10	12-9	13-10	120.4	122.4	124.8	
17.....	8-4	9-9	10-6	10-0	12-8	14-11	120.0	129.9	142.1	
18.....	8-11	10-1	11-1	10-8	13-0	15-8	119.6	128.9	141.4	
19.....	.....	11-7	12-4	.....	12-5	15-0	.....	107.2	121.6
20.....	.....	11-0	11-9	.....	16-6	18-1	.....	150.0	153.8
21.....	.....	11-8	.....	.....	15-6	.....	.....	132.9	.....
22.....	(11-0)*	12-3	13-0	(12-4)*	14-4	15-6	(131.2)*	117.0	119.2	
23.....	.....	10-6	11-2	.....	14-11	15-11	.....	142.1	142.5
Average.....	9-1.8	10-6.6	11-5	11-8.7	13-5.4	15-9	128.5	132.8	138.7	
Median.....	9-2.5	10-7.7	11-7.2	11-8.1	13-10	15-9.5	123.5	129.4	141.2	

* No. 22 did not become a member of the class until September 1919. His records on this first list are not included in the averages and medians for 1918.

The median Intelligence Quotients for the three periods are as follows: 123.5; 129.4; 141.2. This large increase in I.Q. is a matter of great interest. It might be explained by saying that the same children are not used in each group, but we find that the median I.Q.'s for the 15 children who were present for all three tests vary from those given by not more than one I.Q. point. A summary of the I.Q. changes for these 15 children is given in Table XI.

TABLE XI

BINET TESTS OF SPECIAL CLASS. DIFFERENCES IN I.Q. FROM TEST TO TEST, FOR 15 CHILDREN EACH OF WHOM WAS TESTED THREE TIMES

	1918 to 1919		1918 to 1920		1919 to 1920	
	Average	Median	Average	Median	Average	Median
Total Change.....	6.65	4.00	11.07	11.5	8.91	4.4
Increase.....	9.01	9.55	11.54	11.9	12.32	14.2
Decrease.....	3.94	2.20	4.50	4.5	2.08	1.7
Total Increase.....	2.97	2.00	10.47	11.5	7.52	2.4
S.D. of Average Change	5.36		7.27		7.77	

1918—Av. I.Q. = 129.4

S.D. = 12.8

1919—Av. I.Q. = 132.4

S.D. = 11.9

1920—Av. I.Q. = 139.9

S.D. = 11.5

If we compare the I.Q.'s of 1919 with those of 1918, the average change (regardless of signs) is 6.65 points; the average change (regarding signs) is an increase of 2.97 points. The average change (regardless of signs) from 1919 to 1920 is 8.91 points; from 1918 to 1920, 11.07 points. Data as to average increase and decrease for these periods may be found in Table XI. It is, however, worthwhile noting especially that from the second to the third test there are only five decreases; and from the first to the third, only one decrease, a small one of 4.5 points.

The outstanding fact in Table XI is the large I.Q. increase found. Several writers have reported I.Q. changes from a first to a second test, and we may compare our data with these. Rugg and Colloton¹ find an average change of 4.5 points I.Q. Typical

¹ Rugg, H. O. and Colloton, C., "Constancy of the Stanford-Binet I.Q. as Shown by Retests," *J. Ed. Psy.*, 12: 1921, 315-22.

positive differences are less than six points; typical negative differences are approximately three points. They report the average change in pupils with I.Q.'s over 110, as found by three investigators; Terman, 5.8 points; Garrison, 5.6 points; Rugg and Colloton, 4.6. They conclude that "all studies tend to show that differences in retest will be approximately the same irrespective of the intelligence of the pupils." A conclusion contrary to this is given by Baldwin and Stecher,¹ who state that "superior children are more variable from test to test. . . . There is a general tendency for I.Q. increase at later examinations especially in the case of children of superior ability." Comparing the data of Table XI with these studies, we find our average change to be .85 points higher than that given by Terman for I.Q.'s over 110; 1.05 higher than that given by Garrison; and 2.05 higher than Rugg and Colloton. We may compare also the correlation of the first series of I.Q.'s with the second; Terman finds an r of .933; Rugg and Colloton, one of .84; Baldwin and Stecher, one of .85. The correlation for our 15 children is .87.

Baldwin and Stecher are the only authors who give data as to change from a first to a third series of tests, and they give only the correlation. This they find to be .746. Our data show a correlation of .834 between the second and third series; and .880 between the first and third. Although our children show large I.Q. increases from the first to the third test, the increases are distributed among the children in such a way that their relative position is not greatly changed.

A number of factors may combine to cause these large increases:

(1) In the tests of 1918 the children were not acquainted with the examiner; some slight elements of timidity and embarrassment may have lowered the scores made. In the later tests the children knew the examiner; they also considered the test a particularly enjoyable game.

(2) A factor which may have increased the I.Q.'s on later tests was an increased self-control and ability to work independently, both of which seem to have been a result of the instruction in the Special class. The influence of the class in producing changes in emotional attitudes which may have helped to raise the I.Q. will be discussed in Chapter VIII.

¹ Baldwin, B. T., and Stecher, L. I., "Fluctuations of the I.Q. of Normal and Superior Children at Successive Examinations," *Psy. Bull.*, 18: 1920, No. 2, p. 19.

(3) Baldwin and Stecher state that children who are older chronologically are more variable than younger ones; and that there is a general tendency for the I.Q. to increase at later examinations in the case of older children. If this is a general tendency our I.Q. increases *might* be due in part to the fact that our children have moved up from a younger to an older chronological age. In the material published, Baldwin and Stecher do not give possible explanations for the differences noted.

(4) In some individual questions of the various year-groups there may be practice given by the test itself. For instance, if a child does the dissected sentence test in Year XII almost correctly on the first test, he may have some remembrance of it on the second test, and this may help him to solve it correctly, although the innate growth of his intelligence over this period would not have done so. This might be particularly true in tests involving a time-limit, such as the drawing of designs in Year X.

(5) A fifth cause of the large increase may be due to practice on the test outside the taking of the test. In this particular class, the teacher was instructed not to answer any questions connected with parts of the Stanford Revision. But a child might look up the meaning of a word in the dictionary; he might take home a question such as the problems of fact in Year XIV, and get help on it there; he might use the code, of Year XVI, as material for entertaining himself and his friends, etc. There are numerous cases where an intelligent child, with a good memory, might get ideas about a test which would help him greatly when he took it a second or a third time. It seems possible that the older and brighter children will more often gain such help than will the duller and younger. There is the possibility that some of the children were directly coached on the test at home; but the children's conduct during the tests did not indicate this. It is also possible that some of the school work done was so like some of the tests that some help was gained from that source, but this seems to the author improbable.

In an attempt to get some data as to the frequency with which factors (4) and (5) may have acted in this group, we tabulated the separate questions of Years XII to XVIII, inclusive, for each series of tests, in terms of the percentage of children who solved each question correctly. The results are given in Table XII.

Here are shown also the increases in percentage correct from first to second series, from second to third, and from first to third. The

TABLE XII
PERCENTAGE OF CHILDREN SCORING (+) ON SEPARATE TESTS OF
STANFORD REVISION

	1918		1919		1920	Increase 1918-19	Increase 1919-20	Increase 1918-20
	Cor- rect	Not Given	Cor- rect	Not Given	Cor- rect			
XII-1	40.0	....	80.0	....	93.3	40.0	13.3	53.3
-2	33.3	....	73.3	....	100	40.0	26.7	*66.7
-3	33.3	....	53.3	....	86.7	20.0	*33.3	53.4
-4	40.0	....	86.7	....	100	*46.7	13.3	60.0
-5	53.3	....	93.3	....	100	40.0	6.7	46.7
-6	66.7	....	80.0	....	100	13.3	20.0	33.3
-7	53.3	6.7	80.0	....	86.7	26.7	6.7	33.3
-8	53.3	....	93.3	....	100	40.0	6.7	46.7
XIV-1	6.7	....	13.3	....	60.0	6.7	*46.7	53.3
-2	46.7	....	93.3	....	93.3	*46.6	0	46.6
-3	6.7	....	40.0	....	66.7	33.3	26.7	*60.0
-4	6.7	....	40.0	....	60.0	33.3	20.0	53.3
-5	20.0	....	46.7	....	80.0	26.7	33.3	*60.0
-6	40.0	....	46.7	....	73.3	6.7	26.6	33.3
XVI-1	0	....	0	....	0	0	0	0
-2	26.7	13.3	26.7	....	53.3	0	26.6	26.7
-3	0	20.0	13.3	....	53.3	13.3	40.0	53.3
-4	46.7	20.0	60.0	....	73.3	13.3	13.3	26.6
-5	20.0	20.0	33.3	....	66.7	13.3	33.4	46.7
-6	13.3	20.0	40.0	....	80.0	*26.7	*40.0	*66.7
XVIII-1	0	....	0	....	0	0	0	0
-2	6.7	53.3	6.7	6.7	26.7	0	20.0	20.0
-3	13.3	33.3	13.3	6.7	26.7	0	13.4	13.4
-4	0	93.3	20.0	13.3	60.0	*20.0	40.0	*60.0
-5	13.3	33.3	6.7	6.7	13.3	-6.7	6.6	0
-6	0	93.3	6.7	20.0	60.0	6.7	*53.3	*60.0

largest increase in each year's questions (starred in Table XII) will indicate the test on which the children improved most; but this is complicated by the difference in the percentages correct on the first test, and by the varying absolute difficulty of the questions. With these limitations in mind, the reader may draw his own conclusions as to whether these tests are ones which would be especially in-

fluenced by practice in the test, or by the gaining of special help outside the test.

In this connection a small group of graduate students in education were asked to list the questions in each year-group which seemed to them most likely to profit by practice in the test, and also the ones which would most probably profit by outside help. On the first point a majority of the group listed the following: ball and field, XII; induction, XIV; enclosed boxes, XVI; ingenuity, XVIII. On the second point a majority listed ball and field, XII, and ingenuity, XVIII. These judgments may be compared with the results given in Table XII. It seems to the author probable that practice in the test itself may especially increase success on such tests as dissected sentences, induction, and repeating the thought of a passage heard; that outside help may especially increase success on tests such as defining abstract words, difference between a president and a king, arithmetic problems, code and ingenuity. In the case of these children, the author is of the opinion that the gaining of outside practice or help, other than direct coaching, was a fairly large factor in the I.Q. increases, especially from the 1919 to the 1920 tests. It is unfortunate that there was not available at this time a series of questions equivalent to the Stanford Revision of the Binet Scale, such as we now have in Herring's Revision.

(6) It has been suggested that large increases in I.Q. may be due to the fact that the first test was not carried up far enough through the Scale.¹ Terman recommends going up through the Scale until the child fails on all the questions of a year. This was done in all our tests, but it is possible that a child *might* have succeeded in one or two tests in a higher year. In Table XII we have indicated the percentage of children who were not given certain questions on the first and second tests. This is, altogether, a rather large number. But if a child is not given a certain question, and fails on it when it is given a year later, we can be practically certain that he would have failed on it the first time. We find five children who succeed, in the second test, on questions they were not given on the first; and one child who succeeded in the third on a question he was not given on the second. These are cases where the failure to give all the questions on the first test may have lowered the child's first I.Q. These children are Nos. 3, 11, 13, 15, 17 and 18. If all these ques-

¹ See Rugg and Colloton, in *J. Ed. Psy.*, 12: 1921, 315-22.

tions had been passed on the first test (or, in the case of No. 17, on the second), the I.Q.'s would have been changed as follows: No. 3, 136.8; No. 11, 119.5; No. 13, 147.4; No. 15, 131.8; No. 18, 125.2. On the second test, No. 17's I.Q. would become 140.2. It seems very unlikely that such changes would have occurred in the case of No. 3 and 13. They *might* have occurred in the case of the others; and are most probable in the case of No. 15, whose second and third I.Q.'s are 141.7 and 141.2. If these increased I.Q.'s be used for No. 11, 15 and 18 on the first test, and for No. 17 on the second, the average change in I.Q. from the first to the second test becomes 5.95 instead of 6.65; and that from the second to the third, 8.23 instead of 8.91. These data indicate that it is possible that a small amount of the increase found may be due to the first tests' not having been complete enough to fully explore the children's ability.

(7) Kuhlmann,¹ in a study of over 600 feeble-minded, finds that the I.Q.'s of subjects of less than 100 I.Q. decrease as they grow older. In this connection he develops theoretical considerations from which he infers that I.Q.'s over 100 will *increase* with age. He states that a child with an I.Q. of 110 at birth will have an I.Q. of 120 at 10 years, while an I.Q. of 120 at birth will have become one of 145 at 10 years. He believes that there is an actual increase in rate of growth with these children. Kuhlmann's discussion of this point does not seem adequate. At least, studies should be made in which as many as possible of the six preceding factors are eliminated, before we conclude that an increased I.Q. means an actual increase in rate of growth.

It seems to the author that the I.Q.'s of 1919 are probably the most reliable of the three series. They are less likely to be affected by the various factors noted as tending to unduly increase or decrease the I.Q. The median of the 1919 I.Q.'s for the 19 children who were in the Special class for all the school year 1919-20 is 128.9. If we compare this with Terman's tables of frequency we find that only 2 per cent of all children have I.Q.'s as high as, or higher than, 128. All but two of these children would fall in the top 10 per cent of all children; while 8 of the 19 would fall in the top 1 per cent. An I.Q. as high as 162 is probably not found in more than one child in 10,000. It would seem to the author certain that an ideally

¹ Kuhlmann, F., "The Results of Repeated Mental Examination of 639 Feeble-minded Over a Period of 10 Years," *J. Applied Psy.*, 5: 1921, 195-224.

constituted class of gifted children should not contain as wide a range of I.Q.'s and mental ages as was included in this group.

Certain additional comments may be made on the Binet vocabulary test. Table XII shows that none of the children, by the third test, succeeded in passing the XVI or XVIII year vocabulary standards. For the 15 children whose records are given in this table, we find that the average scores in the vocabulary for 1918, 1919 and 1920 are as follows: 36.1, 42.97, 50.9; the ranges are from 24.5 to 50; from 33 to 50.5; from 38.5 to 58.5. If the average vocabulary scores are converted into mental ages these become approximately 11-2, 12-6 and 14-2. Thus, over a two year period, these children made three years' gain in vocabulary. On the other hand, the total average mental age for these children in the three series of tests are 11-7, 12-10 and 15-8; these are all higher than the corresponding mental ages that would be gained by vocabulary alone. Apparently the factors which operated to raise the total mental ages from 1919 to 1920 did not so act as to proportionately raise the vocabulary score.

A comparison of the mental ages reported in this chapter with the achievements in the educational test will be made in Section I of Chapter V.

CHAPTER V

MEASURES OF IMPROVEMENT IN THE SPECIAL AND CONTROL CLASSES

MANY questions of both theoretical and practical importance center about the problem of the ability of gifted children to improve through practice in any function. In the present chapter we shall discuss improvement in the educational tests listed in Chapter III. This will be followed by further data in which the samples of achievement were obtained at more frequent intervals: (1) A study of improvement in the Army Alpha tests, and (2) a study of improvement in the writing of English compositions.

IMPROVEMENT IN EDUCATIONAL TESTS

A study of improvement in the educational tests of the Special and Control classes immediately raises certain important questions. Did the Special class improve more or less than the Control? Did the improvement in each group keep pace with increases in mental age? What differences are there between the groups in this respect? Was the greatest improvement found in the tests with lowest initial scores? etc.

Actual Months of Improvement Found. In the following detailed study of improvement from February 1919 to June 1920, we have used only the records of children who were present for both the initial and final tests in a given subject. This reduces the Special class records to those of 15 children, and the Control records to those of 14 children. One or more of these children may have been absent from a single subject-test, at one or more times it was administered; in this way the number of individual improvements available, in ten different tests, is reduced from a possible maximum of 150, to 127, for the Special class; and from a possible maximum of 140 to 127, for the Control.

The individual scores of each child in February 1919 and June 1920 were converted into grade-month achievement by the method described in Chapter III. The February 1919 achievement was then subtracted from the June 1920 achievement, to give the improvement in months. These individual improvements are shown in Table XIII,—in Section A, for the Special group, and in Sec-

TABLE XIII

IMPROVEMENTS IN TEN EDUCATIONAL TESTS FROM FEBRUARY 1919 TO JUNE 1920, IN MONTHS OF ACHIEVEMENT

A. SPECIAL CLASS IMPROVEMENTS

	Add.	Sub.	Mult.	Div.	Vocab.*	Read.*	Spell.	Compl.	Compo.†	Geog.	Total Improvement	
											Average	Median
1.....	8	..	24	31	20	43	0	40	39	20	25	24
2.....	22	26	32	35	..	..	..	..	..	..	..	..
3.....	-8	20	25	38	21	53	26	45	18	2	24	23
5.....	22	12	27	26	30	7	11	0	53	28.5	21.7	24
6.....	5	14	7	7	..	..	7	19	..	-1	8.3	7.5
7.....	37	28	29	..	24	29	14	24	33	13	25.7	28
8.....	15	17	23	26	1	23	..	36	39	10	21.1	23
9.....	30	17	29	14	27	18	30	-3	15	7	18.4	17.5
11.....	23	7	..	9	..	20	6	32	10	-2	13.1	9.5
12.....	0	14	11	26	..	28	31	40	6	24.5	20.1	24.5
13.....	12	26	32	15	27	25	34	36	3	26.5	23.7	25.5
15.....	29	35	9	42	..	48	24	23	26	5	26.8	26
16.....	18	14	2	15	..	21	..	25	31	16.5	13.3	15.8
17.....	17	..	21	19	39	25	16	3	34	10	20.4	19
18.....	..	..	..	12	23	17	21	16	..	13	17	16.5
Av.....	13.9	19.2	20.9	22.5	23.6	25.9	18.3	24.0	25.6	12.4	20.75	23.5
Med.....	16.0	17.5	24.5	26.1	24.5	21.5	18.5	24.5	28.5	11.5		

Average of all of above 127 improvements = 20.6.

S.D. = 12.8

Median of all of above 127 improvements = 22.1.

 σ av. = 1.13

B. CONTROL CLASS IMPROVEMENTS

1.....	..	..	5	6	4	..	23	..	5	35.5	11.4	5.5
3.....	8	4	-3	7	-2	..	28	30	-6	28	10.4	7.5
4.....	7	0	11	6	9	20	55	30	26	19	18.3	15.0
5.....	13	17	14	26	42	39	31	..	-11	30	22.3	30.5
8.....	8	4	17	11	..	11	34	10	9	45	16.5	11.25
11.....	20	11	-1	3	4	17	26	22	-1	41.5	14.25	14.0
13.....	0	5	..	-8	..	23	..	38	15	..	12.2	10.0
17.....	7	2	10	-2	16	18	21	18	7	15.5	11.25	12.75
18.....	12	9	14	9	12	24	34	-5	4	6	11.9	10.5
27.....	0	9	2	1	25	..	..	19	-1	31.5	10.8	5.5
29.....	16	7	6	11	40	17	40	27	8	26.5	19.85	16.5
32.....	-2	16	4	13	19	16	29	20	47	28.5	19.05	17.5
33.....	23	12	8	4	11	49	16	30	25	-5.5	17.15	14.0
35.....	5	12	14	6	29	28	40	25	23	17	19.9	20.0
Av.....	9.0	8.3	7.0	6.6	17.4	23.8	31.4	25.8	10.7	24.5	15.4	13.4
Med.....	8.25	9.25	8.5	6.7	14.0	20.5	30.0	23.5	7.5	28.5	15.4	13.4

Average of all of above 127 improvements = 15.83. S.D. = 13.4

Median of all of above 127 improvements = 14.5. σ av. = 1.10

Difference between average of all scores for Special and average of all Control = 5.24. diff. = 1.57

*The vocabulary and reading improvements are very inaccurate in some cases because of the difficulty of calculating individual scores which are comparable to the Thorndike method of computing class-scores.

† In measuring improvement in composition to June scores for the Special class were taken from Series 3, while those for the Control were taken from Series 2. (See Section III of this chapter.)

tion B, for the Control. In order that the point from which each group begins to improve in a given test, and the point finally attained, may be known, in Table XIV we give the medians of the individual grade-month achievements in each test, for each group, at both testing-periods. (The individual achievements are given in Table XLIX, in the Appendix, with the exception of the June 1920 achievements for the Special class, which are included in Chapter VIII as Table XLV.)

TABLE XIV

MEDIAN GRADE-MONTH ACHIEVEMENTS IN TEN EDUCATIONAL TESTS FOR
SPECIAL AND CONTROL CLASSES

	Special		Control	
	Feb. 1919	June 1920	Feb. 1919	June 1920
Addition	5-4.2	6-6.3	3-6.5	4-8.5
Subtraction	5-1.5	7-2.5	4-4.3	5-1
Multiplication	4-6.5	7-0.5	4-1.75	4-8.5
Division	4-7.5	7-0.7	4-2	4-8
Vocabulary	6-0.5	9-0	3-9.5	5-6.5
Reading	5-0.2	7-3.3	3-9.3	6-7.5
Spelling	4-5.5	7-1	2-9.5	5-8.5
Completion	6-1	9-0.5	3-3.5	6-7
Composition	6-2	8-7.5	4-5.5	6-2.5
Geography	5-6.5	7-2	3-6.5	6-7.5

ALL TESTS COMBINED IN ONE DISTRIBUTION

Median	5-1.3	7-3.8	4-0.25	5-4.9
Average	5-3.7	7-4.5	4-0.6	5-6.4
S.D.	1-2.8	1-5.8	1-1.4	1-2.4
σ av.	0-1.13	0-1.40	0-1.02	0-1.10

June 1919	{	Average	6-4.8	S.D. = 12.26.	σ av. = 1.04
		Median	6-4.6		
	{	Average	4-4.8	S.D. = 10.85.	σ av. = .93
		Median	4-4.6		

Tables XIII and XIV may be summarized as follows: In February 1919 the median achievement for the Special class was 5-1; for the Control, 4-0. Corresponding averages are 5-4 and 4-1;

the sigmas of these averages are 1.1 months and 1.0 month. In June 1920 the Special median was 7-4; the Control, 5-5; the corresponding averages were 7-4.5 and 5-6; sigmas of averages, 1.4 and 1.1 months. It is obvious that these four averages, for all tests scores combined, are highly reliable. The median of the total 127 improvements for the Special class is *22.1 months*; that for the Control is *14.5 months*. *Both of these were made during the same 13 months of school, plus three vacation months.*

Actual vs. Expected Improvement. If we wish a single-figure comparison of the improvements of the two groups, we find it in the medians of 22.1 months for the Special, and 14.5 for the Control. Is this difference greater or less than we would have expected? This question will be answered first on the basis of the Intelligence Quotients, and second, on the basis of mental age.

The Intelligence Quotient may be used not only to compare chronological age and mental age at a given period, but also to predict probable mental age at a future time. If the I.Q. remains constant from year to year,¹ it ought to give us a basis on which to predict mental age, and thereby, to infer improvement. In work done at Garden City, Franzen found that it was possible to so arrange school conditions that a child's rate of progress was proportional to his I.Q. A child with an I.Q. of 125 should improve one-fourth more, during a given period, than a child with an I.Q. of only 100; during 10 school months, for instance, he should make 12.5 months improvement, while a child with an I.Q. of 100 would be expected to make only 10 months improvement.

The median I.Q. of the 15 Special class children here studied is 130 (by the second series of Binet tests). During 13 months of school work we should expect them to make a median improvement of 1.30 times 13, or 16.9 months. In Table XIII we have shown the median months of improvement in 10 tests; only two of these fall below the expected 16.9 months. The ratios of expected to actual improvement are as follows: addition, .95; subtraction, 1.04; multiplication, 1.45; division, 1.54; vocabulary, 1.45; reading, 1.27; spelling, 1.09; completion, 1.45; composition, 1.69; geography, .68; all tests combined in one distribution, 1.32. It is obvious that, according to this method of calculating expected improvement, the Special class have done much better than we

¹Or if it increases by a known amount, as suggested by Kuhlmann. See Chap. IV, p. 70.

would have expected. The median I.Q. of the 14 Control children is 101; during a period of 13 school months we would expect an improvement of 1.01 times 13, or 13.13 months. The ratios of actual improvement to this expected improvement are as follows: addition, .63; subtraction, .70; multiplication, .65; division, .51; vocabulary, 1.07; reading, 1.56; spelling, 2.28; completion, 1.79; composition, .59; geography, 2.17; all tests combined in one distribution, 1.10. This shows the improvement of the Control class to be a little better than their I.Q.'s would have led us to expect.

The second method of considering expectancy in improvement takes mental age into consideration. From the chronological ages and the I.Q.'s (of the second series of Binet tests) we have inferred mental ages. The median mental age of these 15 Special class children in February 1919 was 12.46 years; in June 1920, it was 14.54 years. We wish to learn how these mental ages compare with the educational achievement of these children on these two dates. We know that the median educational achievement of these children in February 1919 was 5-1.3; in June 1920 it was 7-3.8. Since we do not possess educational *age* norms for all the tests included in this study, we have to infer the probable mental age of the "average" child who is doing work equal to that of 5-1.3 and 7-3.8. If we accept 90 months as the age of completing Grade 1, and 13 months as the time required in each subsequent grade, we can easily convert the grade achievements into probable mental ages. These become, for February 1919, 12.0 years; for June 1920, 14.4 years. If we now compute Accomplishment Quotients (A.Q.'s) for each period, by dividing the educational age by the mental age, the A.Q. for the Special class is .963 in February and .990 in June 1920. That is, the children are accomplishing less than their mental ages would lead us to expect, but this difference has been slightly decreased by one and one-half years in a Special class. This is especially significant since studies by Pinter, McCall and Franzen tend to show that, in the case of bright children who are left in ordinary classes, the educational age falls farther and farther below the mental age, as the children move up through the grades. In this Special class we find exactly the opposite.

For the Control class the median mental age in February 1919 was 10.625 years; in June 1920 it was 11.96 years. Their grade achievements of 4-0.25 and 5-4.7, when converted into probable

mental ages, become 10.8 and 12.35 years. Accomplishment Quotients based on these figures are 1.02 and 1.03. We thus find that these 14 Control children are doing slightly better work than their mental ages would lead us to expect, and that their A.Q.'s have increased very little during this three-semester period.

TABLE XV

INCREASE IN ACCOMPLISHMENT QUOTIENTS, BY TESTS, FROM FEBRUARY 1919 TO JUNE 1920

A. SPECIAL CLASS

	Educational Age		Accomplishment Quotients		A.Q. Increase
	Feb. 1919	June 1920	Feb. 1919	June 1920	
Addition.....	12- 3	13- 7	.98	.93	-.05
Subtraction.....	12- 0	14- 3	.97	.98	.01
Multiplication.....	11- 5	14- 0	.92	.96	.04
Division.....	11- 7	14- 1	.93	.97	.04
Vocabulary.....	13- 0	16- 2	1.04	1.11	.07
Reading.....	11-10	14- 4	.95	.99	.04
Spelling.....	11- 4	14- 1	.91	.97	.06
Completion.....	13- 0	16- 3	1.04	1.12	.08
Composition.....	14- 1	15-10	1.13	1.09	-.04
Geography.....	12- 6	14- 2	1.00	.97	-.03
All tests combined in one distribution.....	12- 0	14- 5	.963	.990	.027

B. CONTROL CLASS

Addition.....	10- 4	11- 8	.97	.98	.01
Subtraction.....	11- 3	11-11	1.06	1.00	-.06
Multiplication.....	11- 0	11- 8	1.04	.98	-.06
Division.....	11- 0	11- 7	1.04	.97	-.07
Vocabulary.....	10- 8	12- 6	1.00	1.05	.05
Reading.....	10- 8	13- 9	1.00	1.15	.15
Spelling.....	9- 7	12- 9	.90	1.07	.17
Completion.....	10- 0	13- 8	.94	1.14	.20
Composition.....	11- 4	13- 2	1.07	1.10	.03
Geography.....	10- 4	13- 9	.97	1.15	.18
All tests combined in one distribution.....	10-10	12- 4	1.02	1.03	.01

The foregoing discussion has been concerned with A.Q.'s for the results of all ten tests combined. Using the same method of converting grade-month achievement into educational age, we calculated A.Q.'s for the separate tests; these are shown for both groups in Table XV.

Comparing A.Q.'s for February 1919 and June 1920, the Special class shows a loss in three tests, addition, composition and geography; the Control, a loss in three,—subtraction, multiplication and division. The largest increase for both classes is in completion. If we divide the tests into an upper and lower half on the basis of February A.Q.'s, the median A.Q. *decrease* in the Control group is .03 for the five highest tests; the median A.Q. *increase* is .04 for the five lowest. Corresponding averages are .006 and .038. Similar medians for the Control class are $-.06$ and $+.17$; averages, $-.01$ and $+.13$. Thus, it is seen that the largest A.Q. increase for both groups is found in tests having the lowest A.Q.'s in February 1919, i.e., those in which improvement was most needed. This A.Q. increase on tests with low initial A.Q. is considerably greater for the Control class than for the Special. If we thus take into consideration the mental ages of the Control class, its condition with respect to these ten tests is remarkably good. This may be accounted for by careful drill, on the part of the Control teachers.

In evaluating this discussion of actual and expected improvement for both groups there are three factors that need to be taken into consideration. (1) If, as Kuhlmann suggests, the Intelligence Quotients of gifted children increase from year to year, the June 1920 A.Q.'s for the Special class would be too high, and the increase of A.Q. from initial to final tests would be too large. But Kuhlmann's theory requires further proof. (2) The A.Q. increase found for the Special class may not indicate the real improvement as much as does the A.Q. increase for the Control. By June 1920 the Special class was scoring up in the seventh and eighth grade norms, while the Control were down in the fifth and sixth. In general, seventh and eighth grade pupils represent a higher selection of children than do the lower grade pupils, because the less able children tend to be eliminated from school before these grades are reached. Norms based on the work of pupils in these grades are proportionately higher than those based on fifth and sixth grade achievement. Therefore, the Special class in June 1920 are striving for scores at a point where norms are *more difficult of attainment* than those used in the case of their own February 1919 scores, and also in the case of the June 1920 scores of the Control group. That is, for purposes of studying improvement the use of such norms tends to reduce the apparent improvement from February 1919 to June 1920 below what it really is and this reduction is greater for the Special class

than for the Control. (3) The third factor is similar in its effects to the second. The children have been doing other things in school besides the ones whose improvement we have measured by tests. The Special class added to their course American History, Greek History and French; these probably decreased the time given to improving in addition, spelling, etc. As far as the author's knowledge of the work of the two class-rooms goes, the improvements shown by the tests measure a larger percentage of the total improvements for the Control than they do for the Special.

In connection with factors (2) and (3) of the preceding paragraph, we may mention briefly the grade-month achievement in June 1919, which gives data for determining what part of the total improvement was made in the four months up to June 1919, and what part in the 10 months between June 1919 and June 1920. The median grade-month achievement for 138 scores made by the 15 selected Special children in June 1919 was 6-4.6; that for the 136 scores made by the 14 Control children was 4-4.6. Comparing these with the medians for February 1919 and June 1920, we find that from the first to the second series of tests, i.e., during four months, the Special class improved 13.3 months; while in the ten months from June 1919 to June 1920, they improved only 9.2 months. Similar improvements for the Control are 4.4 and 10.3 months. The improvement of the latter group is therefore closely proportional to the months spent in school, but no such relationship exists in the case of the Special class. It seems highly improbable that the total improvement of the bright children in ten months was only two-thirds as large as they had made in the four preceding months. It is more likely that the second and third factors suggested on pp. 64 and 65 will help account for the lower Special class improvement in tests between June 1919 and June 1920.

The foregoing discussion of improvement is based on such a small number of children that the results will indicate a general tendency rather than an exact statement of what a special class may accomplish.

Increase in Accomplishment Quotients of Individual Children. In Table XVI are given both the February 1919 and the June 1920 A.Q.'s for each child in the "selected" groups of both the Special and the Control classes. The mental ages used were the ones employed in getting the class A.Q.'s. The educational age used for each child was his median grade-month achievement in ten tests,

TABLE XVI

ACCOMPLISHMENT QUOTIENT INCREASES FROM FEBRUARY 1919 TO JUNE 1920
FOR INDIVIDUAL CHILDREN

A. SPECIAL CLASS

	Mental Ages		Accomplishment Quotients		A.Q. Increase
	Feb. 1919	June 1920	Feb. 1919	June 1920	
1.....	12- 7	14- 6	.99	1.13	.14
2.....	12- 7	14- 6	....	....	...
3.....	13- 1	14- 9	.94	1.02	.08
5.....	13-10	15- 6	.89	.94	.05
6.....	12- 3	13-11	.97	.89	-.08
7.....	12- 5	14- 0	.92	1.03	.11
8.....	13- 9	15- 6	.87	.90	.03
9.....	12- 4	13- 7	.94	1.03	.09
11.....	12-11	14- 7	.98	.96	-.02
12.....	15- 7	17- 8	.76	.81	.05
13.....	14- 7	16- 6	.87	.91	.04
15.....	14- 1	15-11	.83	.96	.13
16.....	11-11	13- 7	1.01	.92	-.09
17.....	11-10	13- 6	1.01	1.04	.03
18.....	12- 7	14- 3	.96	.99	.03
Average.....			.924	.966	.04
Median.....			.94	.965	.045

B. CONTROL CLASS

1.....	11- 1	12- 5	1.00	.96	-.04
3.....	11- 2	12- 7	1.04	.99	-.05
4.....	9- 1	10- 1	1.13	1.18	.05
5.....	10- 5	12- 0	1.06	1.17	.11
8.....	10- 4	11- 8	1.02	1.02	.00
11.....	9- 9	10-10	1.12	1.17	.05
13.....	9- 3	10- 4	1.21	1.26	.05
17.....	9- 2	10- 3	1.14	1.13	-.01
18.....	14- 0	15-10	.89	.88	-.01
27.....	10- 7	12- 3	.96	.93	-.03
29.....	9- 9	11- 0	1.01	1.12	.11
32.....	12- 1	13- 7	.86	.91	.05
33.....	11- 9	13- 1	.91	.94	.03
35.....	10-10	11-11	.99	1.07	.08
Average.....			1.02	1.05	.028
Median.....			1.015	1.045	.043

converted into year-months, by the method previously described. The mental ages are included in Table XVI in order that the reader may note the cases in which low A.Q. goes with high mental age, and vice versa.

In the Special class the A.Q.'s of three children decreased; of these, No. 11 and 16 have comparatively low I.Q.'s; No. 6 was absent from school a great deal. (See Chapter VIII, page 227.) The number of A.Q.'s above 1.00 increased from 2 to 5. In the Control class we find many more A.Q.'s above 1.00 than in the Special, 9 in February 1919, and 8 in June 1920. There are 5 out of 14 A.Q.'s that decrease. If we divide the Special class into an upper and lower half on the basis of February 1919 A.Q.'s, the median increases are .0325 for the upper half, and .0575 for the lower; corresponding averages are .013 and .07. Similar medians for the Control class are .035 and .052; averages, .027 and .029. In the former class there is a tendency for the children to improve who most needed to improve; in the latter class there is practically no difference between the two halves.

A division of the classes into an upper and lower half by means of I.Q.'s,¹ gives the following results: for the Special, medians, .045 and .055; averages, 0.64 and .02; for the Control, medians, —.01 and .055; averages, .01 and .047. The differences between the two halves of the Special class is probably very slight; in the Control there is a difference of .04 or .05 in favor of the lower half. This A.Q. increase of the duller children may be accounted for by factors similar to those mentioned in the next section in connection with the high improvement of children with a low initial achievement. In actual months of improvement, the medians of all scores combined in one distribution, are for the Special class, 23.1 for the upper I.Q. half, and 19.1 for the lower I.Q. half; for the Control, the medians are 13.5 for the upper and 14.9 for the lower.

The Relation of Improvement to Initial Achievement. It seemed probable that there might be some difference between the improvements of those children who began with a high achievement in February 1919, and those who began with a low achievement. In each test, for each group, we found the four highest and the four lowest initial achievements. We then tabulated how much the

¹ Median I.Q.'s for the Special class, upper half, 139; lower half, 122; for the Control, upper half, 104; lower half, 92. Median mental ages in June 1920, for the Special class, 15-6 and 14-0; for the Control, 12-7 and 10-4.

children of each of these groups improved from February 1919 to June 1920. It is obvious that the four highest in one test may not be the same individuals as the four highest in another test. The initial achievements and months of improvement for the low and high sections are shown in Table XVII.

In the Special class we find that the initial achievement of 6-3 for the four highest has been increased by 15.9 months, to 7-9 in June 1920. The initial achievement of 4-4 for the four lowest has been increased by 22.5 months, to 6-6.5. In February 1919 the two sections were 19 months apart, but in June 1920 they were only 12.5 months apart. The lowest four have a median improvement of 6.6 months more than the four highest, but this had not been sufficient to make the June achievement of the two groups equal. In the Control class, the initial achievement of 4-9.4 for the four highest has been increased by 8.75 months, to 5-8 in June 1920. The initial 3-1 of the four lowest has been increased by 19.125 months, to 5-0.4. On the initial test the two sections were 18.1 months apart; in June 1920 they were only 7.6 months apart. The lowest four have a median improvement of 10.4 months more than the four highest,—a difference almost four months greater than that found for the Special class.

In both classes the children who most needed to improve, in the sense of being farthest below the grade in which they were classified, actually have made the greatest improvement. This condition may be the result of several causes. The teachers may have seen that certain children needed to improve a great deal, and therefore directed their teaching especially to those who made low initial scores. The lower ones may have tried harder to improve; or, they may have made unusually low initial scores because of slowness in adapting themselves to test-procedure. The higher ones may have found that their information in these fields was quite adequate to the demands made on them, and therefore made less effort to improve; they may have been more interested in other things, and so have spent much of their time in learning things not measured here. In the Special class, in particular, the tests may have been too easy for the upper 4, and they may therefore not have had a chance to show what good work they *could* do, and thus their full improvement may not show. And finally, as suggested on page 64 the norms used to determine grade-month achievement for these highest children may have been disproportionately higher

TABLE XVII

RELATION OF IMPROVEMENT FROM FEBRUARY 1919 TO JUNE 1920, TO INITIAL ACHIEVEMENT

	Special				Control			
	Initial Achievement		Months Improvement		Initial Achievement		Months Improvement	
	4 highest	4 lowest	4 highest	4 lowest	4 highest	4 lowest	4 highest	4 lowest
Addition	6-4	3-9	7.75	16.25	4-6	2-9.5	4.5	13.25
Subtraction	5-6.5	4-5	15.75	21.0	5-1	3-8	9.25	9.75
Multiplication	4-8.5	4-2.5	16.0	22.5	4-5.5	3-7.5	1.5	12.5
Division	5-1.5	3-9.5	21.5	13.0	4-8	3-7.5	5.5	7.75
Vocabulary	6-8	4-7	34.5	23.75	4-9.5	2-8	8.25	27.5
Reading	5-7.5	4-0	24.5	38.25	5-4.5	3-8	18.75	21.9
Spelling	6-1.5	3-3.5	12.0	22.5	3-8	1-6	28.5	33.0
Completion	8-1.5	4-7	23.75	24.0	5-4	3-1.5	23.5	18.75
Composition	7-7.5	4-5.5	11.25	41.0	7-0	3-0	-3.5	22.5
Geography	8-1	4-6	8.75	10.4	4-9.3	3-1	15.0	19.5
Median	6-3	4-4	15.88	22.5	4-9.4	3-1.25	8.75	19.125
Average	6-4.75	4-2.5	17.58	23.27	5-0.6	3-1.7	11.13	18.64

Average number of semesters in school: Special, 4 highest, 7.7; 4 lowest, 8.0.

Control, 4 highest, 9.2; 4 lowest, 9.4.

than those used in the lower ranges of achievement. In any case, we may be fairly sure that in both groups the children with a low initial achievement improve more than those who began with high achievement.

The Improvement of Selected vs. Non-selected Children. In the present chapter we have studied the improvement of children who were present for both the initial and final tests. It would, however, have been possible to study it from the data of Table IX in Chapter III, and thus have compared *all* the children who took the initial tests with *all* those who took the final tests. The latter method increases the number of cases studied by one-fourth for the Special class, and by one-half for the Control. Comparing improvement for all tests combined, as found by this method, with improvement made by the "selected" cases, we find that the two improvements are practically the same for the Special group; but that in the Control the "selected" improvement is four or five months higher than the "unselected." This is what we would expect to find; elimination from the Special class was not based on lack of ability to do the work of the class, as it was in the Control. The duller children in the Control February 1919 records do not appear at all in the June records. A few dull children have come into the Control group by failures, but they do not lower the June score as much as the *many* dull children lowered the February 1919 score. In the author's judgment, the method of using "selected" cases is, for the purposes of this study, much to be preferred to the method of using "unselected" cases.

Summary of Improvement in Educational Tests. 1. During the period from February 1919 to June 1920, the Special class made 22.1 months of improvement; the Control made 14.5 months.

2. If we compute expected improvement on the basis of Intelligence Quotients the Special class makes 1.3 times as much improvement as we would expect; the Control, 1.1 times as much.

3. In the Special class the educational age, as measured by ten tests, is slightly lower than their mental age would lead us to expect, but this difference was decreased a little between February 1919 and June 1920. In the Control class the educational age is just about what their mental age would lead us to expect.

4. In both Special and Control classes there is a definite tendency for the A.Q. increase to be found in the tests which most need such an increase.

5. In the Special class there is a tendency for the greatest A.Q. increase to be found in the children who most need such an increase. In the Control there is practically no difference between those with high initial A.Q., and those with low.

6. In the Special class children with highest I.Q.'s make greater improvement than those with lower I.Q.'s. In the Control class the reverse is true.

7. In both classes, the four children who began with the lowest achievements made more improvement than the four who began with the highest records.

8. In measuring improvement it is probably unwise to use the records of any children who are not present for both the initial and final tests in a given field.

IMPROVEMENT IN THE ARMY ALPHA TESTS OF
GENERAL INTELLIGENCE

Method and Subjects. The first of the two studies of improvement at frequent intervals used as material the Army Alpha tests of general intelligence. Five forms of the test, each supposedly equal to the others in difficulty, were used; four of these were given a second time, making a total of nine trials. The forms were used in the following order: 7, 5, 8, 9, 6, 5, 8, 9, 6. They were administered on the afternoons of Monday, Wednesday and Friday, for three weeks. This resulted in a one-day interval between five of the tests, and a two-day interval between three of them. The dates on which the tests were given were October 15, 17, 20, 22, 24, 27, 29, 31 and November 3. All tests were administered and scored by the author, according to the directions given in the *Army Handbook* for use with the Army Intelligence tests. The time required for each trial was about 45 minutes. The possible range of scores is from 0 to 212.

The subjects to whom the tests were given require some explanation. The first group, 6A (S), consisted of 19 children of the Special class who were at this time doing 6A work. The second group, 6B (M), was the Control group. At this time five of the brightest of this original group had been given an extra promotion into grade 6A. But 6 children who were probably brighter than the average had been added to the group by extra promotion from 5B. The total native ability of the 39 children in 6B (M) was probably slightly below average. The third group, 6A (F), consisted of 25

6A children who were undoubtedly brighter than the average,¹ and the 5 children from 6B (M) mentioned above. The two 6A groups were tested together. The 6B group was tested during the following hour. In the following discussion the three groups will be referred to merely as S, F and M.

In all three groups there were occasional absences, and a few records were so incomplete that they were discarded. In the data which were finally used for computing central tendencies all children were retained who were present for 8 trials. This left 19 in S, 34 in M, and 27 in F. 20 of the original Control group were included, 5 in F and 15 in M. In using the records of these children who were present for 8 trials the following procedure was adhered to. All *first trials* were combined; all second trials, etc. That is, if a child missed the third trials for the whole group, his next trial, which would be fourth for the group, was included with the third trial for the group. This means that his score on a given form of the test is included with the group score on another form, —and also that the interval between his second and his third trial is greater than for the total group. The total number of such shifts of scores is 73, as opposed to 623 scores which did not have to be shifted. It seems to the author that these changes interfere less with the study of improvement than would the alternative of combining records which represent differing amounts of previous practice. Such an arrangement gives 8 complete trials for 80 children, while the ninth trial has only 56 records.

Comparison of the Groups as to Improvement in the Test as a Whole. In Sections A and B of Table XVIII the median and average scores on each trial for each group are given.

Let us first consider Trial 1, which should indicate the intelligence rating of the three groups. In the *Army Handbook* is given a table of mental ages which are equivalent to various scores in the Army Alpha test. It is of interest to convert the scores on the first trial into mental ages, and to compare these for the groups. These equivalent ages for individual children are given in Table LXI, where chronological ages are added for purposes of comparison. The total range of mental age for the 80 children is from 9.5 years to 17.0 (equivalent to scores of 8 and 115). Wide individual

¹ They were the upper half of a 6A class which had been divided into two classes by the principal, on the basis of a few group tests. The lower half of this 6A class, 6A (R), was given the Army Alpha once, and the results will be mentioned later.

differences are found within a single group. The median mental ages are, for S, 14.75; for F, 14.0; for M, 12.5. Corresponding averages are 14.75, 13.5, and 12.5. With these we may compare the chronological ages: medians, S, 10.9; F, 11.5; M, 11.7; averages, 10.4, 11.0, and 11.4. These data substantiate the statements as to general ability made in the description of the three groups.¹ It will be noted that for even the poorest group the mental age by the Alpha test is higher than the chronological age. It seems probable that while the equivalent mental ages may be cor-

TABLE XVIII

AVERAGE AND MEDIAN SCORES MADE IN NINE TRIALS OF ARMY ALPHA TEST BY THREE GROUPS

A. BY AVERAGES

Trials	1	2	3	4	5	6	7	8	9
6A (S)	75.4	93.4	102.3	100.3	112.2	117.2	120.3	119.1	120.8
6A (F)	59.6	74.6	78.4	80.2	94.1	99.6	101.6	97.8	106.7
6B (M)	39.3	55.5	58.9	57.1	66.3	72.3	74.2	73.5	80.0

B. BY MEDIANS

Trials	1	2	3	4	5	6	7	8	9
6A (S)	74.5	92.5	100.5	97.3	109.5	110.3	120.5	119.5	119.5
6A (F)	62.3	72.8	76.5	76.5	95.5	96.5	101.5	95.5	89.9
6B (M)	36.9	54.4	59.3	59.8	69.5	73.6	75.5	73.5	85.3

rect for adults, they do not hold for children. At the time of the first Alpha test the median mental age, by the Binet test, was 14.0 for the Special class. By the Alpha test the mental age for this group is 14.75. We can also be reasonably sure that the median mental age for M is not actually 0.8 years higher than the median chronological age. It would seem quite possible that a mental age standardization made on adults would not be thoroughly satisfactory for use with children, and our results indicate that such may be the case in the present test.

¹ Group 6A (R), the lower half of the 6A grade of which F was the upper half, made a median score of 43.5 (equivalent mental age, 12.75). Only 3 children made a score higher than the median for F.

On Trial 1 there is so wide a difference between the groups that the median for S is twice as high as that for M. What happens to this difference as the groups carry on similar practice? Do they become more or less alike? Are there any striking differences or

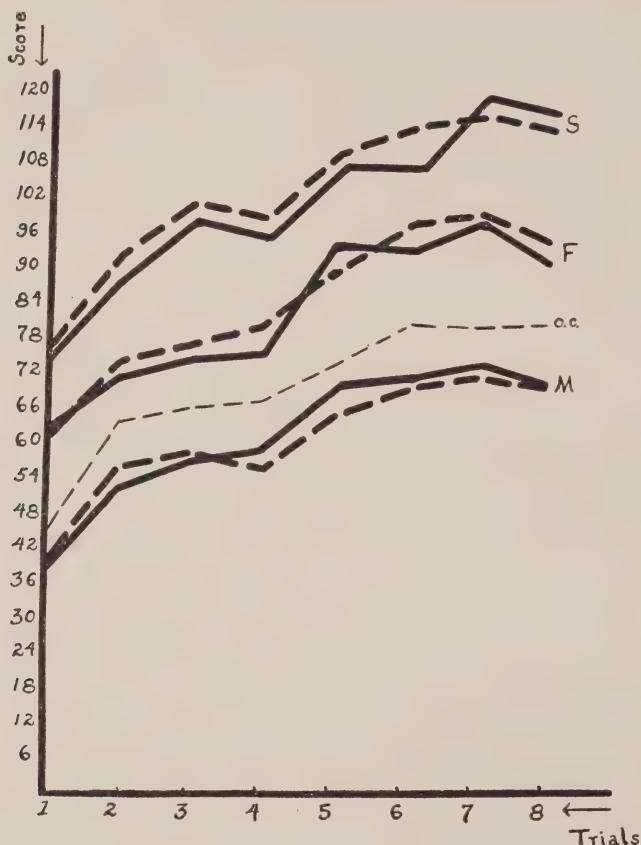


DIAGRAM 2. Army Alpha Test.—Curves of Improvement for S, F and M, by Averages and Medians. Median Curve for Original Control.

similarities in the progress of improvement? The data in Table XVIII help to answer these questions, but the course of improvement is more easily seen in curves based on these data, which are shown in Diagram 2.

It is evident that the Special class consistently scores higher than the other groups. Even the *high* 6A pupils who compose F, and

who are on the average two-thirds of a year older than the Special children, cannot reach the point attained by the latter class.

Let us consider the general form of the curves for the three groups. Those drawn from the average are very like those drawn from the medians; they are slightly less irregular, and we will therefore base our discussion on the average curves. There is a quite remarkable similarity in the form of the three curves. They all show a rapid rise from Trial 1 to Trial 2. This is easily explained by the fact that the general method and form of the test is learned from Trial 1. Trials 3, 5, 6 and 7 each show a slight improvement over the preceding trial. The low scores on Trial 4

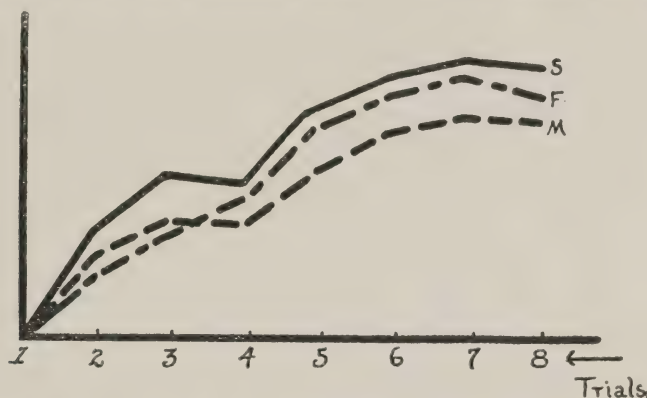


DIAGRAM 3. Army Alpha Test.—Comparison of Form of Average Curves for S, F and M.

are in need of explanation, and certain suggestions as to its cause will be mentioned on pages 86 and 87. Trial 8 in all cases drops below Trial 7. On Trial 6 the repetition of forms which had already been used began, but the score does not seem to have been unusually heightened by this fact. Most of the children did not recognize the repeated tests as having been seen before. The similarities of the form of the curves are shown more clearly in Diagram 3, where the three average curves are superimposed on one another, by making the starting point of the three curves coincide.

It seems to the author improbable that there would have been much more improvement had 5 more trials been given. By the eighth and ninth trials some of the children were becoming very much bored by the work; the effort put forth seemed to be clearly

diminishing.¹ The eighth trial however fell on a Friday which was given to Hallowe'en festivities, and the low score on this day may be explained by a greater interest in other activities. On theoretical grounds it seems quite fair to suppose that a diminution in improvement should occur. By the last trial the children were thoroughly familiar with the nature of the test; they had "speeded up" a great deal. The things which they could not do they failed on because of lack of experience or lack of information, which practice of this sort could not give.

The remarkable thing about these curves is the large amount of improvement found in tests which have theoretically been supposed to be little affected by practice. Of course the different trials were very close together. But even the frequency of practice would not have led us to expect to find the initial score increased by 58 per cent for S, by 64 per cent for F, and by 87 per cent for M, as a result of seven subsequent trials. We may say that there is a general tendency for the eighth trial to be one and two-thirds times as high as the first trial.

The percentages given in the preceding paragraph would lead one to infer that the poorest group, M, really improved more than the Special group. This conclusion is clearly misleading, for the *low* initial score of M actually helped them to attain a high percentage. This brings us to the familiar and difficult problem of how to compare improvements when the curves compared do not start from the same point. In this case the difference in raw scores between the first trial and the eighth is probably more significant than the percentages given. These raw score differences are, for S, 43.7; for F, 38.2; for M, 34.2. But the differences in acceleration of the curves are more clearly shown in Diagram 3. Here we see clearly that the acceleration of the Special curve is greater than the others, and this difference is especially marked in comparison with M. A cursory glance at Diagram 3 might lead one to conclude that this difference in acceleration is rather slight. Yet it is probably about what should be expected from groups differing to the amount these do in native ability. Various rough estimates, none of them thoroughly satisfactory, combine to lead to this conclusion. For instance, the improvement of S, in points,

¹ On the effect of loss of interest in reducing scores on Army Alpha during repeated trials, see Dunlap, K. and Snyder, A., "Practice Effects in Intelligence Tests," *J. Exp. Psy.*, 3: 1920, 357-77.

is 1.28 times as great as the improvement for M. At the time of this series of tests, the ratio of the I.Q.'s of S to those of M was approximately 125 to 100. We should therefore expect S to improve 25 per cent more than M, and this is about what we do find.

On the basis of the foregoing discussion it seems fair to conclude that the Special class not only maintain a much higher level of achievement than does the Control group (as typified by M), but they also actually increase their lead over the duller group. The difficulties which would arise if a teacher tried to teach the children of the two groups in a single class are obvious.

Amount of Improvement Retained. On January 29, 1920, approximately three months after the ninth trial on the Army Alpha, Form 8 of the test was again administered to all the members of the three groups who were present in the school. In answering the question of how much was retained, we encounter the difficulty as to whether we shall compare Trial 10 with Trials 8 or 9. The most useful results are probably obtained by using only the records of the 52 children who were present for all ten trials. From the individual gains and losses from Trials 9 to 10, group averages and medians were computed. These, with the unreliabilities of the averages, are shown in Table XIX. These figures seem to indicate

TABLE XIX

ARMY ALPHA TEST. RETEST AFTER THREE MONTHS, JANUARY 1920

Class	No. Cases	Average	Median	Gain or Loss from Trial 9 to Trial 10		
				By Average	σ av.	By Median
6A (S)	11	120.4	121.5	+ .73	3.55	+4.50
6A (F)	21	104.95	100.5	-3.62	2.68	-3.25
6B (M)	20	77.25	80.7	- .80	2.80	-2.50

that the Special class actually did a little better on the tenth trial than on the ninth; group M did slightly worse; while group F lost most. Of the 52 children, 17 lost 10 or more points, and 9 gained 10 or more.

If the Special class have really improved more, or lost less, than the other groups, this may be due to superior retention, to greater development during the three months interval, or to a combination

of both these causes. Perhaps the most significant fact found is that for the three groups, as wholes, the loss is not greater.

Individual Variabilities in Improvement in Alpha. The foregoing discussion has been concerned with the central tendencies of the groups. We have not taken account of individual differences

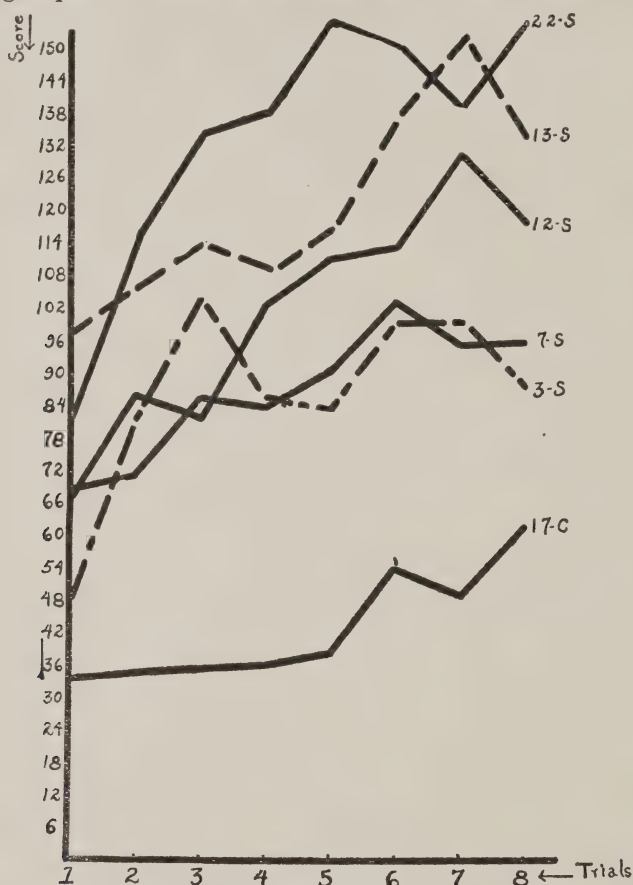


DIAGRAM 4. Army Alpha Test.—Curves of Improvement for Individual Children.

in improvement except as they affect the averages or medians; and in computing these, variability in one direction is likely to be balanced by another child's equal variability in the opposite direction. We will now turn to the problem of the variability of individual improvement. In Diagram 4 are shown curves of improvement for five pupils of the Special class.

It will be seen that some of these curves rise very gradually and evenly; others rise continuously and rapidly for the first few trials, with less improvement later; while still others go up and down in a most irregular manner. Similar curves, both regular and irregular, could be drawn for the individuals of the Control group. One of the poorest Control curves is included in Diagram 4.

Suppose we had before us individual curves for all the 80 children, would we be able to answer the question, Which are more variable in their performance, the Special or the Control group? Probably not,—for such a mass of lines would be presented that any clear comparison would be impossible. In order to answer this question it is necessary to find some way of stating in a single figure the variability of each child, from trial to trial. The 19 children of the Special class and the 20 children of the original Control group were used for such a comparison, and a single figure was computed to represent the tendency of each child to vary in improvement. The method used was as follows: The scores for the 39 children were combined to make a single distribution for each of the eight trials. The average for each trial was obtained, and were found to be as follows: 61, 79, 85, 84, 93, 100, 101, 101. On Trial 1 each child varies to a greater or less extent from the group average of 61. For each succeeding trial a like deviation may be found, but the average to which each score is referred changes for each trial. If we find each child's variation from the average of each trial, we should have for each subject eight deviations from the average curve for the whole group. The size of these deviations will differ greatly, depending on how good or how poor the child's score is. To combine these measures into a single figure, and at the same time to free each from the influence of its position as close to or far away from the average, we proceeded as follows: the average for the eight deviations was found for each child, and then the Average Deviation of the eight deviations from this average was computed. The result is a single figure for each child, which represents his tendency to vary from the group average. A small A.D. means that the child's curve, in *form*, closely follows the group curve. A high A.D. means great deviation from the group curve. The average variability from the group curve, and the A.D. of the eight trials from the average, are shown for 39 children in Table XX. A minus in front of the "average" for a child indicates that he falls below the group curve. The figures in

TABLE XX

DEVIATIONS OF 39 RECORDS IN ARMY ALPHA FROM THE AVERAGE OF THE TOTAL 39
(8 TRIALS INCLUDED)

A. SPECIAL			CONTROL		
	Average of Deviations	A.D. from Average		Average of Deviations	A.D. from Average
2.....	38.2	8.5	1.....	-23.4	4.0
3.....	- 2.4	8.1	3.....	-17.5	8.25
5.....	45.6	6.6	4.....	-24.3	7.25
6.....	7.4	3.75	5.....	2.0	8.75
7.....	- 2.5	3.9	7.....	-34.5	5.75
8.....	- 2.5	3.9	8.....	-22.1	5.9
9.....	- 2.3	4.25	11.....	-17.4	3.1
11.....	18.0	5.75	13.....	-14.6	3.8
12.....	13.3	8.0	16.....	22.6	8.4
13.....	32.6	6.9	17.....	-46.4	6.1
15.....	8.3	7.75	18.....	- 1.3	9.0
16.....	5.5	9.5	23.....	5.3	4.25
17.....	16.0	7.75	27.....	-40.9	6.9
18.....	14.5	5.0	29.....	-24.0	5.25
19.....	6.0	9.75	30.....	16.1	9.9
20.....	40.1	6.4	32.....	-20.8	5.25
21.....	26.3	9.5	33.....	-23.0	3.75
22.....	46.3	10.75	35.....	-16.9	6.1
23.....	15.1	4.4	37.....	- 3.9	13.4
			39.....	-27.6	4.4
Average.....					6.17
Median.....					6.10
σ av.....					.563

Difference between Special and Control averages = .69

σ difference = .752

B. AVERAGE A.D.'S OF 10 BEST AND 10 POOREST IN ARMY ALPHA

	Av. A.D. of 10 Best	Av. A.D. of 10 Poorest
By first trial.....	7.58	5.36
By eighth trial.....	8.27	5.18
By eight trials combined.....	8.05	5.46

this column show each child's total superiority or inferiority in the eight trials.

It is the second column of Table XX, however, which will help answer the question as to the comparative variability of the two groups. The average A.D. for the Special group is 6.86; for the Control, 6.17. The former class is thus shown to be .69 more variable than the Control; but the sigma of this difference is .75, and the difference is therefore not significant. We also compared the ten best and the ten poorest, regardless of the group in which they fall. We have made the selection of these in three ways: first, by the use of the scores on the first trial; second, by the scores on the eighth trial; third, by the use of the "Average" column in Table XX, to represent the eight trials combined. In each case the best ten included two children from the Control group; the poorest ten were all from the Control.

The average variabilities of the ten best and the ten poorest are shown in Section B of Table XX. We find that the variability of the best ten, when selected on the third basis, is 8.05, while that of the poorest ten is 5.46, a difference of 2.59. The sigma of this difference is .61, and the difference may therefore be regarded as highly reliable. Results of the two other methods of selection vary only slightly from these. It is therefore probable that there is a real difference in irregularity of performance: the pupils who do the best are likely to be somewhat more variable from trial to trial than those who make poor scores.¹

The Separate Tests of Army Alpha. We will now turn to a consideration of the 8 separate tests of which Army Alpha is composed. Average scores in each test for each group, and for each trial separately, were computed. The results are shown in Table XXI.

Curves of improvement for each group, based on these scores were drawn, but are not shown here. They emphasize the differences in amount of improvement for the three groups. In three tests the *final* performance of M does not reach the *initial* performance of S, and in the five other tests the overlapping is slight. Any one of these eight tests successfully separates the Special from the Control group.

A further purpose, that of comparing likenesses and differences

¹ By the formula $R = \frac{6\Sigma g}{n^2 - 1}$ the correlation of "high records" (eight trials combined) with "high variability" is +.26; with "low variability" it is -.38.

TABLE XXI

AVERAGE SCORES ON SEPARATE TESTS OF ARMY ALPHA, FOR EACH GROUP IN
EACH OF EIGHT TRIALS

	Trials							
	1	2	3	4	5	6	7	8
Test I:								
6A (S).....	7.7	8.9	10.0	10.2	10.1	10.4	10.5	10.0
6A (F).....	6.9	8.1	8.7	8.7	9.5	9.7	9.5	10.0
6B (M).....	5.1	6.9	7.0	8.2	7.6	9.1	8.4	8.3
Test II:								
6A (S).....	8.1	8.2	8.3	8.6	8.3	9.3	9.8	9.5
6A (F).....	5.9	6.4	7.0	7.4	7.8	7.6	8.1	8.0
6B (M).....	4.8	5.1	5.4	5.5	6.2	6.1	5.9	6.1
Test III:								
6A (S).....	6.3	7.6	9.1	9.7	9.8	10.8	11.2	11.9
6A (F).....	5.0	6.5	8.2	8.7	8.7	9.2	9.6	10.0
6B (M).....	3.4	4.4	6.4	6.5	6.6	6.4	7.9	7.6
Test IV:								
6A (S).....	11.6	12.2	14.6	10.4	14.4	15.4	12.3	12.3
6A (F).....	7.6	8.7	9.2	8.2	11.3	9.6	11.1	8.5
6B (M).....	4.1	5.6	6.7	4.7	6.7	5.7	6.1	7.2
Test V:								
6A (S).....	7.6	10.6	10.9	11.9	13.1	14.9	15.7	14.1
6A (F).....	5.9	9.8	8.4	9.5	11.8	13.0	12.8	11.2
6B (M).....	3.5	6.8	5.7	5.1	7.9	9.1	9.6	8.7
Test VI:								
6A (S).....	6.0	8.3	8.9	9.4	9.4	10.4	10.4	11.3
6A (F).....	4.8	6.1	6.7	8.5	8.4	8.7	9.7	10.2
6B (M).....	3.8	4.6	5.2	5.6	5.7	6.7	7.4	7.3
Test VII:								
6A (S).....	15.5	19.4	22.8	22.9	27.2	29.1	27.5	28.7
6A (F).....	12.6	14.3	16.0	15.2	21.2	22.6	23.4	21.0
6B (M).....	8.1	12.5	12.8	11.2	15.5	17.5	17.1	15.8
Test VIII:								
6A (S).....	12.4	18.3	17.7	17.2	18.2	21.1	19.9	21.4
6A (F).....	11.0	15.1	13.4	13.6	15.3	19.2	17.5	19.0
6B (M).....	6.5	9.8	9.1	10.8	9.8	12.1	11.7	12.8

of curve-form, is served if we draw the three curves for each test as though they all began at the same point. Such curves are shown in Diagram 5.¹

In the light of the data of Table XXI and the curves of Diagram 5 let us discuss each test separately. Test 1, following directions, (perfect score, 12), gives curves which show a slight and gradual rise, approaching a plateau. The Control group shows the greatest acceleration; the Special class the least. This is not surprising when we realize that the Special group averages run as high as 10.5 in a test whose upper limit is 12. The improvement of this group is limited by the amount and difficulty of the material presented.²

In Test 2, arithmetical reasoning, (perfect score, 20), the rise in the three curves is slight and gradual. There seems to be no tendency for the curves to rise on Trials 6, 7 and 8, because of previous experience with the form. The degree of acceleration is lowest for S and highest for F. In a test of this sort it is possible to improve by becoming more accurate on easy problems, by solving more difficult ones, or by working faster. It seems probable that the Special class were nearer their limit, at the initial trial, on all these points, than were the other groups.

Test 3, choosing the best of three reasons, (perfect score, 16), yields curves which rise rapidly, with a following plateau, and then a second rise. The second rise is very possibly due to the repetition of the material in Trials 6, 7 and 8. In degree of acceleration M falls lowest, while F and S practically tie one another for first place. This test is not as dependent on previous training as is Test 2, and the superior native capacity of S shows itself in the improvement made.

Test 4, opposites, (perfect score, 40), presents a very irregular picture. It seems probable that this is in part due to the form of the test, and the method of scoring. The test has forty pairs of words, such as "old-young," etc. Half are synonyms and half are antonyms. After each pair are the words: same-opposite. If the pair mean the same thing, the word *same* is to be underlined; if they are opposite in meaning, the word *opposite* is to be underlined.

¹ Of course the author does not suppose that if group M began with as high a score as that of S, its curve of improvement would be what was actually found. For M to have begun any curve at the same point as S would have meant much previous practice and the curve would be more likely to approach a straight line. This *showing together* is done merely so that curve forms may be more easily compared.

² On the eighth trial in Test 1 there were three perfect scores in S.

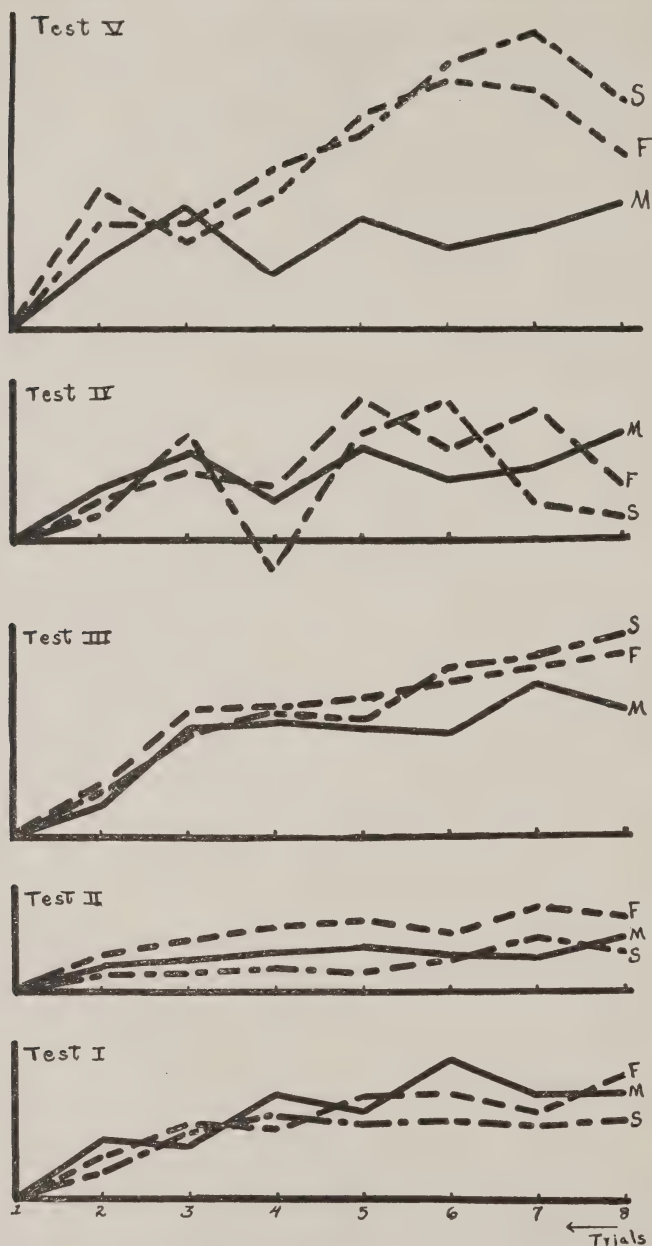


DIAGRAM 5. Army Alpha Test.—Comparison of *Form* of Average Curves for Individual Tests which Compose Alpha.

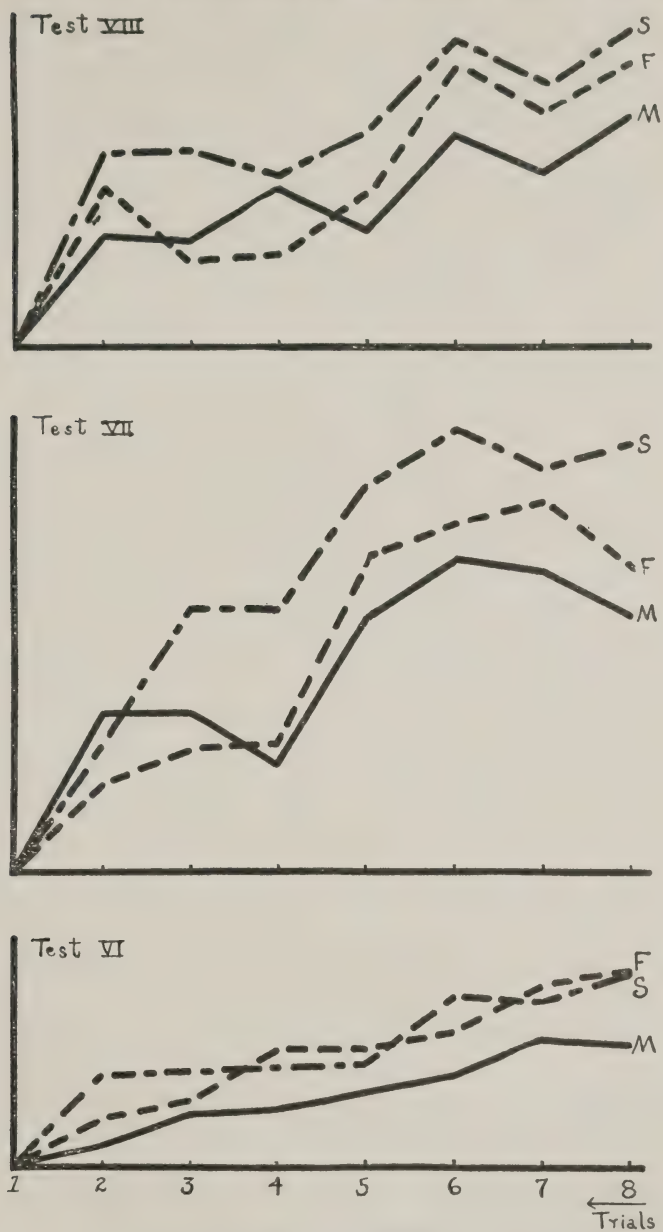


DIAGRAM 5.—Continued.

Since theoretically a chance marking of the words would give half marked "same" and half marked "opposite," the score is "the number right minus the number wrong." This method is probably quite fair for use with adults. If an adult guesses at a word, he is more likely to get it right than wrong. If he has no inkling as to the meaning of the words, he is more likely to leave them unmarked and so is not penalized on that pair. But with a child the situation seems to be different. Many of the pairs are so difficult that the child has *no idea* as to whether they are the same or opposite. He marks the ones he knows very well, but about the last twenty words he is quite at sea. And yet there are the words to be underlined, and he goes shooting down the page in an abandon of dashes! He may mark all of the *sames*, for five words; then change over to the *opposites*, etc. And so his few correct pairs at the beginning may be lost to him because of all the hard words that he tries on but fails to do. A study of the curves reveals low points for all groups on Trial 4. It is possible that the words in this list were harder than those of the other lists. This is also suggested by the low points on the curves at Trial 8, which used the same words as Trial 4. It may be that all the variations in this test are due to differences in the difficulty of the material, but that seems unlikely. One questions whether the groups have profited at all by the practice. Observation of the children as they worked on this test seemed to give evidence of a dashing down of almost any mark, in the last three or four trials. The differences in degree of acceleration for the three groups is slight. A combination of ranks gives F first place and S second place. The curve for the Control group is least irregular,—possibly an indication of their smaller tendency to dash at things in a quick and impulsive fashion.

Test 5, rearranging words to make a sentence and then marking whether the sentence is true or false, (perfect score, 24), gives very similar curves for S and F: a rapid and regular rise, with a slight dropping off at the end. The curve for M shows much less acceleration and is also more irregular. The ability to think out quickly how words must be arranged to form a sentence requires a quickness of comprehension in which the Special class excel, but which seems to be seldom found in the duller children.

Test 6, completion of number series, (perfect score, 20), contains some very difficult elements, and there is no limitation placed on improvement through lack of sufficient and difficult material.

The curves all show a gradual and steady rise; the acceleration for M is less than for the other groups, which tie one another on this point. In this test there are various methods of working possible, and practice seems to help the brighter children in finding better methods of work, and thus increasing their scores.

Test 7, analogies, (perfect score, 40), shows consistently low scores in Trial 4. As with Test 4, this may be due to unusually difficult material in the Form used in this trial. The low scores in these two tests on Trial 4 account for the low points in the curves for the total Army Alpha at this trial. (See Diagram 2.) There are very clear differences in acceleration on this test, M being the lowest and S the highest. This test requires an ability to see relationships between ideas, which seems to be possessed in unusual degree by the children of the Special class.

Test 8, information, (perfect score, 40), depends upon the subject's *breadth* of observation, his reading, etc. It is a sort of range of interest test. The curves vary in form quite definitely from those for the other seven tests of Alpha. There is a rapid rise from Trial 1 to Trial 2, due to the advantage of knowing the general nature of the test. But the points for Trials 2, 3, 4 and 5 move up and down slightly, with no definite acceleration. Apparently this is a type of test where practice on different material, but of the same type, does not improve the record. Trials 6, 7 and 8 repeat material previously used, and immediately the curves rise. Some of this rise is undoubtedly due to the fact that, although the pupils did not know that certain tests would be repeated, they looked up names, etc., which they had not known on the first trial. Improvement in Trials 6, 7 and 8, over Trials 2, 3, 4 and 5, seems greatest for F and least for M. Our results suggest that a test of general information is an unusually good test of intelligence: it separates groups well and is also less subject to practice effect than some other tests. On the other hand, a subject may perhaps be more easily coached in this type of test.

To summarize the foregoing discussion: the Special group make higher records in all tests than do the other groups. In degree of acceleration they are clearly superior in disarranged sentences, analogies and information. They are closely similar to F in choosing the best reason and in completion of a number series. They fall in third place in following directions, arithmetical reasoning and opposites.

A further question with regard to the separate tests of Army Alpha is the following: In which of the eight tests does each group make the greatest improvement? There is little to be gained by drawing curves of improvement for a group, in each test, on a single page. The fact that the tests have such varying initial scores makes such a comparison impossible. It is necessary to make the scores for the different tests in some way more comparable. Since Test 6 has a possible score of 20 and Test 7 has a possible score of 40, one might maintain that the two tests would be made comparable by multiplying all the scores in Test 6 by two. But this would imply that if there were twice as much of Test 6, the scores in it would, by average or median, equal the score in Test 7. This, however, would not always be the case. The Special class makes an initial score of 6.0 in Test 6, and one of 15.5 in Test 7. If there were twice as much of Test 6, corresponding to Test 6 at each point in difficulty, we would expect an initial average of two times 6.0 or 12.0. This is obviously less than the 15.5 necessary in order to make both curves start at the same point. If, on the other hand, we multiply 6.0 by 2.6, we get a result of approximately 15.5. That is, if there were 2.6 times as much of Test 6 as there actually is, we should expect the Special class to give an average of 15.5, the same as that found for Test 7. If then we multiply all the Special class scores in Test 6 by 2.6, we should be able to draw a curve which would be more nearly comparable with the curve for Test 7.

Such a process as the foregoing has been followed for each test with each group. The highest score on the initial trial is on Test 7 for all three groups. That score was divided by the initial score in each of the other tests to give a figure by which the scores for all eight trials should be multiplied. These multipliers are given in Table XXII.

Each score in Table XXI was multiplied by the proper multiplier. The individual test curves drawn from the resulting "corrected" scores will, for a given group, commence at practically the same point. The *form* of the curves, however, will vary in different tests, according to the original figures.

On the basis of the "corrected" scores it is now possible to rank the different tests as to the likelihood that a given group will improve much or little in that test. Such rankings have been made for each group by three methods: (1), by the scores on the last

TABLE XXII

MULTIPLIERS USED IN "CORRECTING" THE SCORES OF TABLE XXI, SO THAT ALL CURVES FOR EACH GROUP WILL BEGIN ON THE SAME SCORE

Test	6A (S)	6A (F)	6B (F)
1.....	2.0	1.7	1.6
2.....	1.9	2.1	1.7
3.....	2.5	2.5	2.4
4.....	1.3	1.7	2.0
5.....	2.0	2.1	2.3
6.....	2.6	2.6	2.1
7.....	1.0	1.0	1.0
8.....	1.3	1.15	1.2

trial; (2) by the highest score obtained in each test; (3), by a combination of all trials (by the method of ranking the tests in each trial separately, adding these ranks, and reranking on the basis of the sums). These rankings are shown in Table XXIII.

TABLE XXIII

RANKING OF 8 TESTS OF ARMY ALPHA, AS TO AMOUNT OF ACCELERATION

		RANKING IN TRIALS							
		1	2	3	4	5	6	7	8
I. By last trial:									
6A (S).....	6	7	1	8	4	2	3	5	
6A (F).....	6	7	2	8	3	1	5	4	
6B (M).....	7	8	2	6	1	5	3	4	
II. By highest score:									
6A (S).....	6	8	1.5	7	1.5	3	4	5	
6A (F).....	7.5	7.5	3	6	1	2	4	5	
6B (M).....	6	8	2	7	1	4	3	5	
III. By 8 trials combined:									
6A (S).....	6	8	1	7	2	3	4	5	
6A (F).....	8	7	3	6	2	1	5	4	
6B (M).....	5	8	2	4	1	6	3	7	

From curves drawn from the "corrected" scores and from the data in Table XXIII, certain facts as to the degree of acceleration are clearly shown. Group S improves very little in Tests 2 and 4; there is a medium degree of improvement in Test 1; Test 8 has a clear path above 1; and above that Tests 3, 5, 6 and 7 cross and

recross following the same general direction of high improvement. In F the curves are much less clearly separated from one another; Tests 1 and 2 are clearly at the bottom; Test 4 falls in irregularly above; all the others cross and recross, but with Test 6 away at the top. Group M gives still more interlocked curves; Test 2 is at the bottom with very little improvement; Tests 3, 5 and 7 are clearly at the top, and the others fall in between.

Summarizing the above we find that differences between the groups, as to acceleration in the different tests, are slight. All have low acceleration on Tests 1, 2 and 4; all have high acceleration on Tests 3 and 5, while 6, 7 and 8 have an intermediate place. The difference that *is* found is that the 8 curves for the Special class "spread" much more; i.e., the different tests are more unlike one another in degree of acceleration than is the case for the other groups.

Summary. The facts concerning this study of improvement in Army Alpha test may be summarized as follows:

1. On the initial trial large differences in score were found between the groups.

2. There is much improvement in all three groups; the general tendency is for Trial 8 to be one and two-thirds times higher than Trial 1.

3. The Special group increase their lead over the other groups as practice increases; i.e., their degree of acceleration is greater.

4. In a tenth trial, given three months after the ninth trial, the average scores are about the same as on the ninth trial. The Special class lost a little less than the other groups.

5. The pupils who do the best are likely to be somewhat more variable from trial to trial than those who make poor scores.

6. In all the separate tests which compose Army Alpha, the Special group make higher scores at each trial than do the other groups.

7. In degree of acceleration, the Special class ⁽¹⁰⁾are clearly superior to the other groups in Tests 5, 7 and 8 (disarranged sentences, analogies and information); they fall in third place in Tests 1, 2 and 4 (directions, arithmetic and opposites).

8. When Tests 1 to 8 are compared, wide differences in acceleration are found. Tests 1, 2 and 4 show little improvement, while Tests 3 and 5 show much improvement. There is very little difference between the three groups on this point.

IMPROVEMENT IN ENGLISH COMPOSITION

Another study in improvement used the writing of compositions. The material to be reported includes 31 sets of compositions from the Special group and 9 from the Control group. These were obtained at various intervals, over a period of 67 weeks. They divide readily into three series: the first set, obtained by the author in the spring of 1919; the second, obtained by the author throughout the school-year of 1919-20; the third, obtained by Miss Lenore Corbin, in the spring of 1920. A description of each series follows.

Compositions: Series 1. This series of compositions contains 17 compositions for the Special class, which were obtained by the author at the rate of one per week, for 17 weeks. The series also contained four compositions from the Control group,—two which were given on approximately the same dates, and also used the same topics as the first two for the Special class; and two more which were given on the same dates and used the same topics as the last two for the Special.

Two methods of assigning topics were used. On the first day of the series each child was given a paper on which these words were typed: orphan, garden, hungry, station, parents, clothing, visitor, cottage, train, country. The following directions were read to the class:

At the top of your paper are 10 words. I am going to give you 20 minutes in which to write a story containing these 10 words. Of course you will need to use many other words, but be sure to use each of these 10 words. You do not need to use them in the same order as the order at the top of the paper. Try and think out the story you are going to write before you start, and see that the progress of the story will enable you to fit all the words in properly. Make the story the best and most interesting you can.

No help was given the children, except that occasionally the spelling of a word was written on the blackboard. The same words and directions were used for the Control class.¹

The second composition used a different list of words, and the same instructions, except that this sentence was added, "Make the story long enough so that you will use all the 20 minutes in writing it." This was added because some of the children, especially in the Control group, showed a tendency to try to merely put the 10

¹ These words and directions were taken, in modified form, from Whipple, *Manual of Physical and Mental Tests*, Test 46.

words in a few loose sentences, without trying to write a story. As a result they would use only five minutes of their total time. As the series continued, the Special class used more and more of the time allowed. In the third and fourth compositions other lists of words were used. On the fifth, a single topic was given, "What I would like to do next Saturday," for which a twenty minute time-limit was allowed. From this point on, lists of 10 words and single topics alternated. On the last two trials the same lists of words were used as on the first two. The lists of words and topics for the 17 weeks are listed in Table XXIV.

TABLE XXIV

WORDS AND TOPICS FOR COMPOSITIONS IN SERIES 1

1. Feb. 21. Orphan, garden, hungry, station, parents, clothing, visitor, cottage, train, country.
2. Feb. 28. Snowstorm, children, ticket, clock, dog, screams, church, basket, river, ice.
3. Mar. 10. Thief, landlord, crab, shake, hotel, basket, cries, provisions, escape, custody.
4. Mar. 17. Softly, streets, sea-green, hungry, street-car, hurry, woman, electric, weary, loving.
5. Mar. 24. What I would like to do next Saturday.
6. Mar. 31. River, ancient, light, forest, wall, linger, singing, happy, sunset, nature.
7. Apr. 7. What I want to do when I grow up.
8. Apr. 14. Carve, checkers, fire-side, curtain, radiant, parting, murmur, hasten, music, sorry.
9. Apr. 21. A story from Greek history.
10. Apr. 28. Merchant, park, evening, rose-leaves, sleepy, crimson, faster, fairy, vanish, feet.
11. May 5. Lost!
12. May 12. Listen, children, pleased, soldier, dinner, smiling, French, poor, share, sister.
13. May 19. A chapter from the autobiography of a baby.
14. May 26. Wreck, terror, storm, hurried, violent, sailor, cave, roared, food, island.
15. June 2. The story of the caskets from the Merchant of Venice.
16. June 9. Same as for Feb. 21.
17. June 16. Same as for Feb. 28.

After each trial the compositions were carefully typed, exactly as written by the child. After the typing, each was proof-read, to make sure that no errors made by the child had been omitted in the typing. Each composition was then scored by four people, the

TABLE XXV
COMPOSITION RATINGS. SERIES 1, 1919. AVERAGES AND MEDIANS OF INDIVIDUAL SCORES.

A. SPECIAL CLASS

	1	2	3	4	5	6	7	8	9	10
	Feb. 21	Feb. 28	Mar. 10	Mar. 17	Mar. 24	Mar. 31	Apr. 7	Apr. 14	Apr. 21	Apr. 28
Average.....	47.1	48.2	46.8	49.1	47.4	49.3	45.9	53.0	53.2	52.0
Median.....	47.5	48.5	45.5	47.3	45.5	52.3	48.75	54.0	51.25	52.0

	11	12	13	14	15	16	17	Av. of Feb. 21 and 28	Av. of June 9 and 16
	May 5	May 12	May 19	May 26	June 2	June 9	June 16		
Average.....	51.5	50.4	52.3	51.56	51.4	46.9	49.3	47.1	48.4
Median.....	51.0	50.8	50.0	49.8	50.5	46.5	50.5	49.3	48.9

B. CONTROL CLASS

	1	2	3	4	Average of Feb. 24 and Mar. 3		Average of June 9 and 16	
	Feb. 24	Mar. 3	June 9	June 16				
Average.....	39.6	39.0	43.3	40.7	40.3		42.7	
Median.....	38.0	36.4	43.5	41.75	37.8		41.8	

author and three others, by the use of the Nassau County Composition Scale.¹

The compositions were not graded until nearly all had been written, then the various sets were graded in chance order, and it is unlikely that the judges' increased practice in scoring seriously raised the scores at any point in the series. The median of the four ratings on each composition was used as its final score.

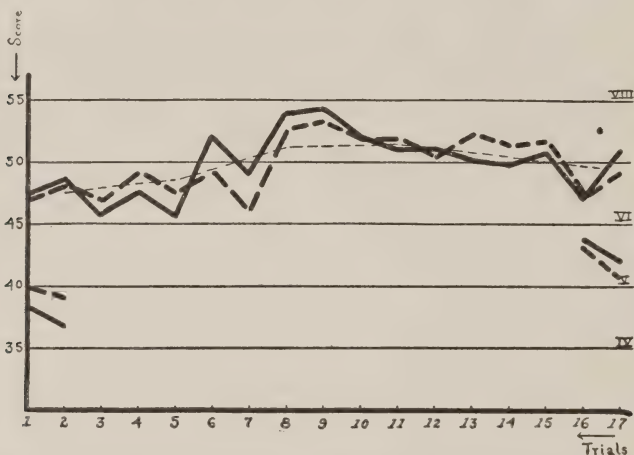


DIAGRAM 6. Compositions: Series 1. Curves of improvement for 17 weeks of practice for Special. Initial and final achievement for Control.

Broken lines = average curves.

Solid lines = median curves.

Light horizontal lines indicate grade norms.

We thus obtained careful scores of the 17 sets of compositions for the Special class and for the four sets for the Control. The group averages and medians of these scores for each set are shown in Table XXV,— in Section A for the Special class and in Section B for the Control. This also shows averages of the first two and the last two sets for each group.

Curves of improvement based on the data in this table are given in Diagram 6.

¹ Each of the judges was given preliminary training on compositions, the correct values of which were known. This training was continued until the judge was fairly consistent with his own previous scores on a given set of compositions, and until he did not deviate greatly from the standard scores. The author is indebted to the following for the grading of this series of 17 compositions: Miss Jeanette Reamer, Miss Minnette Fritts, and Mrs. Ruth Kellar.

It will be noted that there is considerable difference between the averages and median curves. We shall base our discussion on the median curves, since an occasional extreme measure has undoubtedly raised or lowered some of the averages too much.

If we take the general trend of the Special curve, ignoring slight variations from trial to trial, we find a tendency for a small amount of negative acceleration, through the fifth trial. The curve then rises through the ninth trial, where the group reaches its highest record. After this it drops to a considerably lower level, which is maintained with little variation from trials 11 to 17 inclusive. Or, the same facts may be viewed in a slightly different way, as follows: we combined in a single distribution all the scores of the first three sets, and found the median; we did the same for consecutive sets of three, leaving only two sets for the last combination. A curve based on the resulting medians is shown by the dotted line in Diagram 6. It reveals very much the same condition as that mentioned in the first part of this paragraph. If we compare the median of the first two trials combined, 49.3, with that of the last two trials combined, 48.9, the latter is slightly lower. But if we compute a median for all the scores made in the first five sets and a similar median for the last five sets, we find that the first is 47.0, and the last is 50.65. This is equivalent to an improvement of 7 school months.

For the Control group the median of the first two trials combined is 37.8; of the second two, 41.8,—an improvement equivalent to 8 school months achievement. This is more than the improvement made by the Special class, even though we use for the latter group the more favorable comparison of the first five with the last five sets. At the beginning the difference between the two groups is equivalent to 18.4 months, while at the end it is equal to 17.7 months. If, however, we limit the cases to the children who were present for both the February and the June tests, the improvement for the Control is only 3 months. Further facts as to the difference in improvement between the two groups will be brought out in the second series of compositions.

Let us consider the curve for the Special class in more detail. Minor variations are probably due to difference in the difficulty of the topics. One of the most difficult problems in conducting an improvement experiment in composition is that of finding topics which will prove of equal appeal. The attempt was made to have

a series of varied interest, some suggesting adventure, others attractive pictures, others exposition, etc., but those used are by no means an ideal series. Figure 10 would seem to indicate that word-lists 1 and 3, and topics 5 and 7 are least productive of good compositions. Perhaps these are less likely to give free rein to the play of imagination in which these children seem to delight. The "orphan" list is rather commonplace; the "thief, landlord" list does not suggest vivid events to these inland children; both topics, "What I would like to do next Saturday" and "What I want to do when I grow up," seem to hold the children tied to the commonplace, every-day world. But assign "A story from Greek history" or the "carve, checkers" list, and the inventive imagination of these children works out stories and tales which receive very high scores.

We wished to learn whether the word lists or the topics produce the best compositions. If we combine the 97 scores from the compositions based on lists 4, 6, 8, 10, 12 and 14 in a single distribution, and find the median, it is 52.1. If we find a similar median for the 94 scores obtained from the 6 topics, it is 50.3. This seems to indicate a slight advantage in the word lists. This may be due to the fact that the lists are better, as lists, than the topics are as topics. It more probably means that the lists suggest more of the framework of a story. It should be noted, however, that there was a very wide variation in the kind of story suggested to different pupils by the same word list.

Perhaps the most baffling problem presented by the curves in Diagram 6 is to explain why the improvement of the Special class began to fall off after the ninth trial. Suggested explanations are as follows: (1) The topics *may* have been more difficult, but the author sees no reason for supposing this to have been the case. (2) The fact that the children did not know how well they were doing on this series of compositions may have affected the curve. The typing and complicated scoring required made it impossible to report the best records until the very end of the year. This may have led to lessened interest and effort. The having these compositions written was an attempt on the part of the experimenter to find out what the children were gaining from their regular composition work, but it is quite possible that these compositions, done as tests, failed to tap the pupils' real ability. Lack of competition, of knowing the results of their work, of favorable or unfavorable

comment, may all contribute to the lowering of the last part of the curve. Further evidence on this point will be furnished by Series 2 and 3. (3) The children had learned to expect that any test given by the experimenter would afford some rather unusual sort of entertainment. To have to write a composition during one of the test periods each week soon lost its novelty. Some of the children were quite frank in showing their annoyance at the continued repetition of that kind of test. Some such state of mind as this may have served to lower the scores in the later trials.

Compositions: Series 2. The second series of compositions consisted of 5 compositions from each group, obtained during the school year 1919-20. The general method was the same as that for the first series. The dates, word lists and topics used are shown in Table XXVI.

TABLE XXVI

WORD LISTS AND TOPICS FOR COMPOSITIONS IN SERIES 2

1. Oct. 13, 1919. Basket, flame, water, smothered, quickly, baby, alarm, crying, raging, ladder.
2. Nov. 5, 1919. My last ride in an aeroplane.
3. Jan. 26, 1920. Circus, telegram, clown, sawdust, merry, lost, elephant, band, kitten, march.
4. June 2, 1920. Wilderness, rapids, mischief, cliff, deer, pursue, kodak, canoe, thunder, frying-pan.
5. June 10, 1920. The lost treasure.

The compositions were typed and graded as in the first series. The three judges, aside from the author, were not the same as for the first series, but they were trained in the same way, and were, as far as the author can judge, equally competent.¹ The median of the four scores was obtained for each child; averages and medians of these individual scores are shown in Table XXVII. This also shows combined scores for the first two and the last two tests of the series.

The period between the two initial and the two final sets is $7\frac{1}{2}$ months. As far as the data of Table XXVII indicate, the Special class has improved only from 53.0 to 54.5, which is equivalent to 3 months achievement. During the same period the Control group

¹ The author is indebted to the following for grading these ten sets of compositions, and also the nine sets of Series 3: Miss Eugenia Moses, Miss Mary York, and Mr. Dale Nysonger.

TABLE XXVII

COMPOSITION RATINGS. SERIES 2, 1919-20. AVERAGES AND MEDIANS OF INDIVIDUAL SCORES

A. SPECIAL CLASS

	1	2	3	4	5	Av. of 1 and 2	Av. of 4 and 5
	Oct. 13, 1919	Nov. 5, 1919	Jan. 26, 1920	June 2, 1920	June 10, 1920		
Average.....	48.9	54.1	50.1	52.7	53.4	51.8	53.4
Median.....	49.8	56.5	52.0	53.3	54.5	53.0	54.5

B. CONTROL CLASS

Average.....	41.2	41.8	45.3	43.7	45.8	41.0	44.7
Median.....	40.8	40.0	44.5	43.5	43.8	40.8	44.5

has improved from 40.8 to 44.5, which is equal to $7\frac{1}{2}$ months of achievement.

The data obtained from this series furnish two points of useful evidence: (1) They give us some idea of the improvement of the Control class. (2) For the Special class, interesting comparisons are made possible with the data of Series 3.

Compositions: Series 3. The third series of compositions was obtained by Miss C., the teacher of the Special class. It consisted of 9 compositions, taken from the regular written work in the language class. The children did not know that certain of their compositions were to be made the subject of special study. In this way it was hoped to avoid some of the unusual factors which influenced the writing of the first and second series. The assigning of topics was slightly more detailed than that used in the other series. The teacher gave out the topics just as she would in any language lesson; for instance, she may have reviewed exactly what a character-sketch should be, etc. None of these assignments gave much in the way of suggestion, however. There was no rewriting after criticism. The dates and the assignments are shown in Table XXVIII.

TABLE XXVIII

TOPICS FOR COMPOSITIONS IN SERIES 3

1. March 12. Around the Marble-Ring.
2. March 17. One of the following: At the Saw-mill; Story the Wagon-wheel Told; The Old Swing; From Peach-blossom to Peaches and Cream; A Mishap; Turpentine Tales.
3. March 26. A description of Ichabod Crane as he rode to see Katrina VanTassel.
4. March 31. Completion of a mystery-story. (The teacher told the class a thrilling tale of a mysterious card which had on it writing in a foreign language. The men who found it could not find anyone who would translate it for them. The class were told to complete the story.)
5. April 9. A character-sketch of Rosalind. (The class had just heard "As You Like It" read aloud.)
6. April 13. A Ride in an Aeroplane.
7. April 23. Treasure Island. (Most of the class had just been to see a moving-picture of it. Those who had not seen the picture were allowed to write on any topic they wished.)
8. May 7. A Further Adventure of Robin Hood. (The class had just heard a number of tales about Robin Hood read aloud.)
9. May 14. Some verses modeled on the form of "This is the house that Jack built," which was read and discussed before the children began to write.

These compositions were not typed but were scored from the original papers, by the four judges used in Series 2. The four ratings for each composition were combined, and averages and medians of the individual scores for each set are shown in Table XXIX.

TABLE XXIX

COMPOSITION RATINGS, SERIES 3, 1919. AVERAGE AND MEDIAN OF INDIVIDUAL SCORES. SPECIAL CLASS.

	1	2	3	4	5	6	7	8	9
	Mar. 12	Mar. 17	Mar. 26	Mar. 31	Apr. 9	Apr. 13	Apr. 23	May 7	May 14
Average	63.4	63.2	58.8	61.7	51.5	62.1	58.2	66.3	65.1
Median	63.5	63.3	58.8	65.3	52.5	61.5	58.5	66.3	68.3

The compositions were also given two independent ratings by Miss C., who had had preliminary training in the use of the Nassau County Scale. A combination of her two ratings yields medians which are from 10 to 15 points higher than those obtained by the four judges mentioned. It seems probable that she is either naturally a very high grader, or else her interest in the children caused her to rate them unusually high. If the 9 medians that she ob-

tained are ranked so as to indicate the poorest set, the best set, etc., and if the medians in Table XXIX are similarly ranked, the following comparison may be made:

Set.....	1	2	3	4	5	6	7	8	9
Rank by Miss C.....	6	4	8	2	9	7	5	1	3
Rank by Four Judges...	4	5	7	3	9	6	8	2	1

Evidently there is very little doubt as to which are the best and which are the poorest sets of compositions.

A curve based on the data of Table XXIX is shown in Diagram 7.

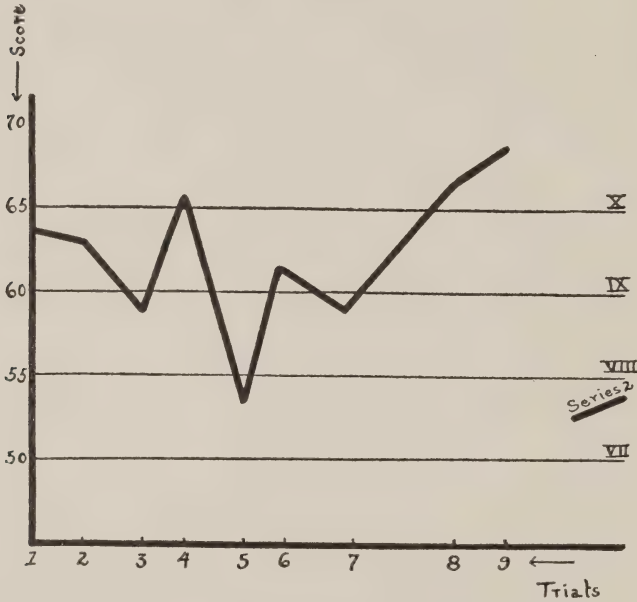


DIAGRAM 7. Compositions: Series 3. Special Class.

Median Curve of Improvement.

(Also June (2 and 10) Achievement for Series 2 of Compositions.)

Light horizontal lines indicate grade norms.

As a measure of improvement the curve is not very satisfactory. The large fluctuations are probably due, for the most part, to differences in the difficulty of the topics. To write a character-sketch of Rosalind seems to be very difficult for children of this age and grade. The two best class records in the series are made on the topic, "A further adventure of Robin Hood," and on the verses modeled on "This is the house that Jack built." Both of

these give much opportunity for imaginative flights. Descriptive writing, combined with some imaginative narrative, is permitted by topics 1 and 2, and high scores are made on these. The facts shown in this curve, together with others in Series 1, lead the author to conclude that these bright children, as a group, write best when they are allowed a great deal of freedom for productive imagination.

The general tendency of the compositions in this series is to be equal to June achievement for Grade IX,—and this was at the time when they were just finishing the work of Grade VII. The results of Series 3 is the basis for the statement made on page 45 that an achievement of 7-7.5 was probably too low for the Special class in June 1920.

How can we reconcile the facts found in Series 3 with those found in Series 2? The two June points for the Special group, in Series 2, have been added to Diagram 7 to show the wide difference in attainment found in the two series. Series 3 gives a median performance at least one and one-half grades higher than Series 2, and yet both were obtained in the same room, during the same school-year and the compositions in both were scored by the same judges. The fact that one set was typed and one was not might have caused a *slight* difference, but the author would expect such a difference to be in favor of the typed sets, whereas the difference is in favor of the untyped sets. In Series 1 and 2 it was not possible for any child to fail to hand in some attempt at a composition. In Series 3, the author feels that occasionally an unsuccessful bit of writing may have been kept by the child and thus the class median may have been raised. This may have happened in Set 9, where only 9 papers were handed in, out of 18 children enrolled in the class. Of course some of these omissions were due to absences, but it is doubtful whether they all were. However, if we consider only the more complete sets, we still find that the class achievement may be considered as that of Grade IX.¹

It seems to the author fairly certain that the presence of factors in Series 3, the absence of which was noted in Series 1, account for the high median score in the former series. There was a mild degree of competition. The children knew that the teacher would read their stories and would comment on them. They knew that some of them would be read aloud. A social stimulus was present

¹ It is of interest to remember in this connection that in June 1920, the Special class reached an achievement of 9-0 in Visual Vocabulary.

which had been largely lacking in Series 1 and 2. This seems to be a case where samples of the usual school work are better measures of achievement than samples obtained under experimental conditions. We wish to know how well the pupils *can* write, under favorable conditions, and the test conditions of Series 1 and 2 were evidently not the most favorable.

The very high performance of certain individuals in Series 3 should be noted. For instance, No. 15 made a median score of 67 on the nine compositions,—or an achievement of 10-5. At this time this little girl was only a little over 11 years of age, but she had a mental age of 15 or 16 years.

It would be valuable to know whether compositions taken from the regular language work of the Control group would show much higher scores than the ones they made in Series 1 and 2. It is quite possible that they would be somewhat higher, although it is unlikely that the difference would be as great as that found in the Special class. The Control group, in Series 1, wrote only 4, instead of 17, compositions, and this may have actually served to maintain higher effort and interest on Series 2. The total median improvement for the Control class from February 1919 to June 1920, as shown in Tables XXV and XXVII, is 13 months; average improvement, 9 months. (This may be compared with the data in Table XIII.)

How much does the Special class really improve from the beginning of Series 1 to the end of Series 3? This is difficult to say, because we do not know what score they would have made in February 1919, if samples of the regular class work had been used. The first two compositions written probably suffered less from lack of social stimulus than did the succeeding ones, and it may be that a grade achievement of 6-9 in February 1919 is fairly accurate. If this does represent the real ability of the class, then the improvement from February 1919 to June 1920 would be approximately 20 months. We can at least be sure that in June 1920 the Special class were writing much better than would be expected of children just completing the work of Grade 7.

Individual Variability in Composition. In the study of improvement in Army Alpha we found that the children who made the highest records were the more variable from trial to trial. Does the same hold true for the compositions? Individual variability for the Special class pupils was computed for the compositions of

Series 1 and Series 3, separately. The method used was the same as that for the Army Alpha, except that the first set of deviations was taken from the median instead of from the average. Variabilities were not computed for children who were represented by less than 13 out of the possible 17 compositions in Series 1, and by less than 6 out of the possible 9 in Series 3. The results for each series are shown in Table XXX.

The column "Average of Deviations" in each case indicates the child's total ability in composition. In Series 1, for instance, note the wide range from the best record, an "average" of +14.3, to the poorest, an "average" of -10.1. In Series 3 the range is much less, from +3.8 to -8.0. This difference may easily be due to the difference in the personnel of the class at this time. The median A.D. for Series 1 is 3.95; for Series 3, 3.7.

If we now separate the class into an upper and lower half on the basis of the "average of deviations," and then find the variability for each half, we get the figures shown at the bottom of Table XXX. These results for both series indicate that the children who write the best compositions tend to be less variable than those who write the poorer ones, but the differences are too unreliable to be very significant. It may be that a child with generally high ability in this field is less disturbed by variation in the difficulty of the assignments. It may be that he does so much more writing than the poorer writer that he is more near his limit of improvement for a given stage of development, and therefore varies less, because he has reached a temporary plateau of even accomplishment. The first suggestion is probably more useful than the second.

We have here an apparent difference between the compositions and Army Alpha. Objection might be made that in the former case we compared the upper and lower halves of the Special group, while in the latter we compared the best ten and the poorest ten, selected from the Special and the Control. Would the situation change for the Army Alpha if we compared the upper and lower halves for the Special class? This comparison is easily made and we find that in Army Alpha the 9 highest of the Special yield an average variability of 7.6, while the 9 lowest have an average variability of 6.5. This difference, however, has a very low reliability, since the sigma of the difference is as high as 1.0. If there is a real difference as to individual variability in improvement in Army Alpha and composition, it may be explained in part by the

TABLE XXX

INDIVIDUAL VARIABILITIES FROM THE MEDIAN OF THE GROUP IN COMPOSITION.
SPECIAL CLASS

	Series 1		Series 3	
	Average of Deviations	A.D. from Average	Average of Deviations	A.D. from Average
1.....	....	...	....	....
2.....	- 1.0	4.4	+1.9	3.4
3.....	- 1.25	3.6	....	....
4.....	+14.3	3.9	....	....
5.....	- 4.75	5.5	+3.0	2.7
6.....	+ 2.5	4.0	....	....
7.....	- 9.7	5.3	....	....
8.....	- 4.0	4.8	....	....
9.....	- 0.3	1.8	-4.25	2.7
10.....	-10.1	3.3	....	....
11.....	....	...	+0.4	5.6
12.....	- 6.5	4.8	-8.0	4.3
13.....	+10.6	2.5	+0.75	3.75
14.....	+ 3.9	3.2	....	....
15.....	+ 6.7	3.2	+3.	3.6
16.....	+ 0.8	5.2	+0.8	3.1
17.....	- 4.3	3.8	-2.1	4.6
18.....	+ 2.1	3.9	+1.1	2.45
19.....	....	...	-2.4	8.0
20.....	....	...	+1.3	6.2
21.....	....	...	....	....
22.....	....	...	+3.8	2.4
23.....	....	...	+0.4	3.8

Av. A.D. of 8 highest = 3.46

Med. A.D. of 8 highest = 3.50

Av. A.D. of 8 lowest = 4.44

Med. A.D. of 8 lowest = 4.85

Difference between averages = .98

 σ diff. = .45

Av. A.D. of 7 highest = 3.4

Med. A.D. of 7 highest = 3.1

Av. A.D. of 7 lowest = 4.7

Med. A.D. of 7 lowest = 4.3

Difference between averages = 1.3

 σ diff. = .75

fact that Army Alpha was a more unfamiliar activity than compositions. In the former there may be more of a tendency for the brightest children to make unusual spurts, from which they sink back to a lower level. In composition, a more familiar and

complex performance, there is less tendency for unusually high records.

Influence of the Intelligence Quotient on Achievement in Composition. Another useful question to answer is that of how a child's ability in composition is related to his I.Q. Using the I.Q.'s from the second series of Binet tests, the Special class was divided into an upper and lower half, for Series 1, and an upper and lower half for Series 3. In both series the upper half were younger in chronological age, but older in mental age than the lower half. We found the median score in composition for each half, for each set of compositions in both series. The results are shown in Table XXXI.

In Series 1 the lower half tends to score better during the first seven trials, but from that point the upper half are clearly better. The children with lower I.Q.'s may have been more influenced by a feeling of boredom, as the series continued; they may have been more dependent on the social stimulus than were the children of higher I.Q.'s. In Series 3 there is very little difference between the two halves; sometimes one half is higher, and, as often, the other. The difference between Series 1 and 3 may be due to changes in the personnel of the group. It may be that the socialized atmosphere present in Series 3 brought the achievement of the lower half up to what they were really capable of doing. If we compare the two halves by the "average of deviations" in Table XXX, the median value in Series 1, for the upper half is +0.6, and for the lower half, -0.8; in Series 3, it is 0.75 for the upper half, and 0.8 for the lower.

The data in Table XXXI do not give any conclusive answer to the question of whether children of higher I.Q. write better than children of lower I.Q. The problem is complicated by the difference in median chronological age of the two groups. It seems probable that, if the two groups had been equal in chronological age and had kept the same difference in I.Q., the upper half would have written much better than the lower half. The most interesting suggestion offered by these data is the possibility that bright children of lower I.Q.'s require more social stimuli, praise, etc., in order to write their best.

Summary. The following conclusions are suggested by Series 1, 2 and 3 of compositions.

1. The Control class improves in composition about 14 months during 13 months of school. From an initial score of 4-5 they rise to a final score of 5-9.

TABLE XXXI
 MEDIAN SCORES IN COMPOSITION FOR UPPER AND LOWER I.Q. HALVES OF SPECIAL CLASS. SERIES 1 AND 3

	TRIALS																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
SERIES 1																	
Upper half*	51.8	48.0	43.5	43.8	46.5	51.5	46.3	55.8	55.5	53.5	55.3	50.8	57.5	51.8	54.0	50.5	51.8
Lower half†	46.5	51.3	49.5	48.8	44.5	53.5	48.8	53.8	46.8	51.5	48.8	50.8	50.0	48.5	49.3	45.5	49.5
SERIES 3																	
Upper half‡	59.5	63.8	62.5	65.5	51.5	61.5	58.0	67.5	68.5								
Lower half§	67.5	61.8	57.0	65.3	53.5	61.8	59.3	66.2	62.5								

* Consisted of Nos. 1, 2, 4, 8, 12, 13, 15, 17, 18. Medians: C.A. 9-10; M.A. 14-1; I.Q. 142.

† Consisted of Nos. 3, 5, 6, 7, 9, 10, 11, 14, 16. Medians: C.A. 10-7; M.A. 13-0; I.Q. 124.

‡ Consisted of Nos. 1, 2, 8, 12, 13, 15, 17, 20, 23. Medians: C.A. 11-1; M.A. 15-0; I.Q. 142.

§ Consisted of Nos. 3, 5, 7, 9, 11, 16, 18, 19, 22. Medians: C.A. 11-9; M.A. 14-1; I.Q. 120.

2. The initial score of the Special class is approximately 6-9. If the general tendency of Series 3 is taken as a measure of their final achievement, they reach 9-0. Their improvement during 13 months of school is approximately 20 months.

3. The children of the Special class seem to be much influenced by the presence or absence of social stimuli. Much better writing is done under the stimulus of a normal class-room environment. This seems to be especially true in the case of children with less high I.Q.'s.

4. It is not clear that, within the Special class, children with higher I.Q.'s write better than those with lower I.Q.'s, but there is some evidence in favor of this conclusion.

5. For the Special class, lists of 10 words, as a suggestion for a composition, were more productive of good compositions than were single topics.

6. The Special class children write better on subjects which permit much productive imagination than they do on more commonplace, every-day matters.

7. There is some evidence to show that pupils who write the better compositions are less variable from trial to trial than those who do not write so well.

CHAPTER VI

CLASS-ROOM ACTIVITIES OF THE SPECIAL CLASS

WE have, up to this point in the discussion, given little idea of what went on in the regular school work of the Special class. Without this a correct conception of the group cannot be obtained. We shall therefore proceed in the present chapter to indicate some points in connection with the class work. Several sources of information will be used: (1) Detailed reports of the class, written by the teacher. (2) The results of class-room observations by the author, who spent between 300 and 400 hours in the class-room,—testing, teaching and observing. (3) 150 pages of typed manuscript, which were the result of stenographic accounts of school work, made in the Special and Control classes over a period of two weeks.¹ These sources of information will be combined to give the reader as vivid an idea as possible of what went on in the class-room.

THE REGULAR WORK OF THE CLASS

The results of instruction of bright children bear a very close relation to the aims and efficiency of their teacher. It will, therefore, be of interest to know just what the teacher of this class tried to accomplish in her work with them. The following quotations from her reports will indicate some of her aims:

The utmost freedom was allowed in matters of recitation, methods of procedure, etc. There was no certain amount of work that had to be accomplished, nor was any specified method of working required. In fact, the children themselves really determined what was to be done, unconsciously for the most part, of course. The teacher aimed to give them what they needed, what they wanted and liked, and what they were prepared for and could use. . . . The work of the class was arranged so that subjects were not "skipped," but *included*. A great deal could be gone over rapidly, but the work was not disjointed or erratic. It was made to "connect up" with the following grade in such a way that the children could take their places again in the old system if necessary. . . . The greatest freedom of speech, thought, opinion and action were encouraged. The children were urged to ask questions, or to volunteer information at any time, concerning any line of

¹ The author wishes to here express her thanks to the Graduate School of Ohio State University for the funds which were used to finance this stenographic study. She also wishes to record her appreciation of the careful and thoughtful work done by the stenographer, Miss Marguerite Von Gerichten.

work or interest. . . . It was aimed to develop in every possible way the individuality of these children. . . . The teacher wished the children to be as unassuming, as natural and as unself-conscious as possible.

The teacher and the author talked together a great deal concerning things which would contribute to the welfare of the children, and were usually quite in harmony as to the course to pursue. At the beginning of the class the author presented to the teacher the following statement of her own ideas as to the general trend of the class work:

The children should have enough work assigned so that they will really work all the time they are in school. Too much emphasis should not be placed on covering the work of *many* school grades. Much of the extra time available should be given to acquiring a wider acquaintance with cultural and scientific material. There should be as little routine work as possible, but any that is necessary should be done accurately. Emphasis should be placed on the development of ability to work independently, to take the initiative, to use imagination in a constructive way. The teacher should guide the pupils when necessary, but should leave them to work on their own responsibility as much as possible.

The attempt to put these aims into practice resulted in several types of lesson, among which the following may be especially noted. (1) Lessons in which the teacher explained some principle or method to the class, and the children then showed their understanding of it by putting it into practice. (2) Lessons in which some one read aloud and the whole class then discussed what had been read. (3) Lessons in which the teacher questioned the class on material they had studied. This often became a general discussion centering around some problem raised. (4) Lessons in which the children asked questions about some topic in which they were interested, and the other pupils and the teacher tried to answer the questions. (5) Lessons in which some child reported on some topic he had investigated. Such a report might last twenty or thirty minutes. This was usually followed by general discussion. Such reports that the author remembers hearing are the following: a trip I took through a paper-mill; a journey I made on a canal-boat; how a telephone works; some of the great bridges of the world; how rubber is made; how I cooked a meal.

These aims and methods have been given in such detail because of their direct effect on the work of the class. Later we shall take occasion to return to them to learn how satisfactory the results were.

In November 1919, the Special class contained 11 children who

were classified in 5B, and 7 were in 4A. A brief review of the last part of 4A and the first part of 5B work was given to the seven 4A children, and soon all of the 18 children were doing the same work. By June 1919 all of the group had completed the work of 6B, and were promoted to 6A. That is, 11 children had done one and one-half years' work during one school year, and 7 had done two years' work. During the year 1919-20 all of the children who remained in the class did the work of Grades 6A, 7B and 7A. We have shown in Chapter III that in June 1920 these children, as a group, were fitted to begin the work of Grade 8.

Let us now turn to a more detailed discussion of the nature of the work done in these three grades. During the first year the following represents the class program: opening exercises; music; language; arithmetic; word study; reading; (noon period of 1½ hours); current events; geography; calisthenics; literature and composition; Greek history. On one day per week a special teacher gave an hour's art lesson. On another day the boys received an hour of manual training and the girls an hour of sewing, both from special teachers. All the other work, with the exception of Greek history, was taught by Miss C., the Special class teacher. During the second year American history and French were added to the program; less attention was paid to arithmetic and reading, as such. The order of subjects in the program was often changed, to meet the demands of some special interest.

Music. The work in music was the regular technical work of Grades 5, 6 and 7. The supervisor of music complimented the children on the accuracy of their work, and recommended special songs outside of the usual routine. The children's voices were sweet, but not as strong as those of some of the children in the Control class. None of the children showed very unusual ability in vocal music.

Language. The work in language for the first year is stated as follows by the teacher:

A great deal of paragraph writing was done, also descriptive and narrative writing; notes and letter-writing, both social and business. They were given a rudimentary idea of versification and enjoyed practice in original work in this direction. Limericks were found to be a prolific source of material for exercising their ingenuity and for exhibiting their facility in rhyming. A play was written in collaboration.

Some simple work in technical grammar was given in connection with the work in composition. During the second year the follow-

ing represents the type of work done: parts of speech and their use; cases of noun and pronoun; subject and predicate; transitive and intransitive verbs; present, past and future tenses; person and number; original story writing; retelling stories; business and social letters; character sketches; newspaper articles; advertising.

Some of the best work done by the teacher and class was this work in language. In Chapter V we reported data as to improvement in composition writing. But in order to give a vivid idea of the children's work in this field, samples of it must be presented. The verse writing did not reveal any remarkable young poets, but it was the source of much enjoyment to the children, and probably contributed much to their appreciation of real poetry. One day the teacher read aloud Riley's "Circus Day Parade," and then asked the children to write poems of their own having the same general form and spirit. The following was one of the best handed in:

No. 5, May 13, 1919. The Circus Day Parade.

Oh the circus day parade!

How the horses neighed and neighed!

And oh, we were so hungry but we stayed and stayed and stayed!

Oh, the great band wagon shone

Like a piece of polished bone,

And a clown on top most wonderful that played a saxophone.

Oh the circus day parade!

How the horses neighed and neighed!

And oh, we were so hungry, but we stayed and stayed and stayed!

One of the city papers carried on a contest in writing limericks; a prize of one dollar was given for each one published. The Special class children were each allowed to hand the teacher several limericks, and from these she chose the best to send to the newspaper. As a result one boy and one girl received a one dollar prize. Among the limericks submitted were the following:

No. 12. The H. C. of L is sure bad,
And it seems like a thief to poor dad;
Every time he goes out
He hears somebody shout
That starving is now quite the fad.

No. 3. There was an old man of Lynn
Who lacked a bottle of gin,
So he made his high-ball
Of wood alcohol,
And now, of course, he's all in!

One day in February 1920 when the children were allowed to write verses on any subject they wished, the following was handed in by No. 13:

An oriole in the orchard,
The trees all snowy white,
With blossoms that look like snowflakes,
Was there ever a prettier sight?

The violets in the meadow,
The ferns beside the wall,
The wild flowers in the meadow,
Our Father made them all.

Assignments calling for newspaper articles, advertisements, etc., brought out some good work. We include here an account of a fire in F School, which was intended for a school news bulletin.

No. 1. Fire! Fire!

A few days ago the F School had a small fire. The furnace got overheated and burst and burnt two rooms. I was in the hall of the fifth story when the fire occurred. I rushed to the phone and called the fire department, then rushed outdoors. "Oh look! The fire department," cried one of the boys. "Fire! Fire!" exclaimed some one.

The fire department had arrived by that time and jets of water were pouring on the flames and puffs of smoke were issuing from the doors.

About fifteen hats and coats were lost and a boy who took music lessons lost his music case and two sheets of music. Another boy got burned, but not seriously. No one got seriously burned or injured, which I am glad of. They have not had any school in two of the rooms, but probably will soon.

During the first year an interesting assignment called for a completion of Frank Stockton's story of "The Lady or the Tiger," which the teacher had read aloud to the class. When she had come to the dramatic question at the close and had put aside the book, the children protested vigorously at the ending of the story at such a point. "Why *did* you read it to us,—if it wasn't going to be finished!" was the general protest. Nevertheless, they soon became interested in telling how they would have completed it. High tragedy was the note of most of these papers. Three children allowed the hero to be devoured by the tiger; five gave him unreservedly to the lady. The others presented various modifications, such as: the hero married the lady, but she soon died and then he married the princess. Two of the most dramatic accounts were these:

No. 11. The Lady or the Tiger.

He turned the knob! out jumped the tiger. Why had the princess deceived him, her lover. She hated the other woman. She had vowed to her god that he should not marry this other woman. He was dead. He was gone to the earth. After many months of unhappiness she drank poison in her despair.

No. 22.

Now as this princess hated the lady in the other door she had moved her hand toward the right. The man walked to the door and opened it. Out sprang the tiger, his mouth wide open. His teeth were white with the foam which was falling from his mouth. The youth sprang to one side and coolly drew from his brightly colored boot a long dagger which the princess had given him before he entered the arena. With this glittering weapon held high above his head he stood waiting for the next leap of the hungry tiger. He did not long wait. There was a yellow streak in the air. The tiger had sprung. It was over in a second. The next instant the tiger lay wallowing in a pool of blood at the feet of the youth. He had won. The king was so surprised that he gave the youth his daughter in marriage. The princess and the youth were married and they lived happily till the end of their days.

The play previously mentioned was written in May 1919. It was a war play and was entitled *The Call to Arms*. All of the work on it was done as a group effort. Quoting from the teacher's report:

The children chose the name for the play, and planned its structure and development. They were given several days to think out incidents and situations, necessary to the action, and from countless suggestions, they chose what finally was made into the play. Some of the action in the battle scenes which grown-ups might think better left off-stage, they were unanimous in wishing actually portrayed. "We want our fellows to do something. We don't want them to come on the stage and just tell about it," they said and so they put everything in!

The children were all so eager to help in the play, they were all so bubbling with suggestions, that it is a wonder that a coherent play ever resulted. But it did, and without a very large amount of direction from the teacher.

The play was planned so that the children could act it, and so each boy and girl must have a part in it, and that part must be adapted to his or her abilities. The complete play of about 3000 words consisted of three acts and twelve scenes, an enumeration of which will give some idea of the trend of the action. Act I, Scene 1. Livingroom of the Darron home, U. S. A. Act II, Scene 1. Billets somewhere in France. Scene 2. The same. Scene 3. In trenches. Scene 4. The same. Scene 5. No Man's land. Scene 6. Another part of No Man's land. Scene 7. Same as 5. Scene 8. In trenches. Scene 9. Same as 6. Act III, Scene 1.

American hospital in France. Scene 2. Darron livingroom, U. S. A.

We have presented the composition work in such detail, partly because it is one of the fields in which we can actually give the children's own products; partly because we feel that the development of ability to write well is one of the most important things the Special class work accomplished.

Arithmetic. The work in arithmetic was somewhat more formal and followed the text-books more closely. Drill in the fundamental operations, fractions and decimals was given. Percentage and interest were presented, and practical problems were solved. At one time the children planned the furnishings of a house and made out orders for all the furnishings from catalogs. From this they learned a great deal about household expenses. A number of the children were earning money, part of which was used for buying their own clothing, as well as for "luxuries." They were encouraged to keep accounts of their own expenditures, and a number of them did this very carefully. The second year continued the work of the first, and added much simple algebra. As a whole the author considers the work in arithmetic good, but not especially remarkable.

Spelling. In spelling, the work was, for the most part, incidental to language and written work in other subjects. Most of the spelling lessons were on work which the children had not studied. Each child then wrote the words he missed in a notebook and studied them until he could spell them correctly.

Reading and Literature. When the class was organized most of the boys and girls read aloud very well, and all were excellent silent readers. Reading, therefore, soon became the study of literature, and really good selections were read aloud to the class by pupils and teacher. Toward the end of the first year, when the children were doing 6B work, the teacher read *The Merchant of Venice* aloud. Of this she writes:

The Merchant of Venice held first place in their hearts. Pupils who knew that they would be absent from a session would beg that no more be read until they could be present, lest they miss any "Shakespeare." As soon as the teacher picked up the little red volume of the Merchant, the children at the back of the room would leave their seats and come forward, sitting with those nearer the teacher, several times, especially in the court-scene, even coming gradually closer until several were standing around the desk looking over at the book. When sent back, they protested, saying that they seemed to be getting nearer to it all.

Many other books were read aloud, some of them books of real literary value; others had value as giving information about animals, far countries, etc.; still others were read merely because some of the children liked them and wished to have the others enjoy them also. There were a few in the latter group which were of such doubtful value that the author questions whether the time spent in reading them aloud was well spent. The following is a fairly complete list of the books read aloud. First year: *Wild Animals I Have Known* (Earnest Seton-Thompson); *Michael O'Halloran* (Gene Stratton Porter); *Merchant of Venice*; selections from Kipling, Alfred Noyes, and some of the younger poets. Second year: *Little Women*; *Kwahu* (Moran); *Hans Brinker*; *Black Bruin*; *Primrose Ring* (Ruth Sawyer); *A Victor of Salamis* (W. S. Davis); *Evangeline*; *Miles Standish*; *Twelfth Night*; *The Young Visitors* (Daisy Ashford); *Tom Sawyer*; *Just David* (Eleanor Porter); *Boris in Russia*; selections from Whittier and Macaulay; selections from the modern poets. Some of these books were read in the literature period, and some during the opening exercises.

One of the worthwhile results of the literature presented was the broadening of the reading tastes of the children. Boys and girls who had not liked poetry came to really enjoy it. Perhaps the greatest triumph was in the case of No. 7 who said when he entered the class, "Oh, I don't care about reading. All I ever read are the funny papers!" But this same boy became one of the most devoted lovers of Shakespeare's plays.

The children read a great deal silently in school,—whenever they had a few minutes of free time. A circulating library of magazines and books which was brought together by the children was used continually. Among the magazines which heaped the library table were current copies of the following: *National Geographic*, *Youth's Companion*, *American Boy*, *The Mentor*, *Current Events*, *Popular Mechanics*, *Popular Science*, and *St. Nicholas*.

From having observed these children as their teacher was reading to them, it seems to the author that the average difficulty of the material read might have been considerably greater, with little diminution in the enjoyment resulting. A well-selected library, containing well-written books, on subjects and themes which do not require an emotional development beyond what the children possess, should be one of the most important elements in the equipment of a class-room for bright children. It seems to the author

that the difficulty is in finding books which really use all of the intelligence such children possess, and yet do not require too great an emotional and instinctive maturity.

Geography. The geography lessons brought into play the results of much of the wide reading the children had done. Under the vivid interest of teacher and pupils geography became a tremendously live subject. The cold facts of location, surface, climate, etc., were illuminated by accounts of the customs and history of the peoples in the countries studied; their dress, manners, commerce, industries, etc., proved stimulating topics for discussion. Text-books were supplemented by magazine articles, pictures, stereopticon views, and specimens of ores, woods, etc. The author also heard many geography lessons in the Control class. They were very formal in nature, with few contributions from the children other than brief answers to questions on the text-book. The differences between the geography lessons for the two classes are, however, not entirely due to the pupils, for the teacher of the Control lessons was more formal in her presentation, and there was much less opportunity for the children to present additional material.

History. The work in Greek history which was taught by the author will be presented in some detail a little later. During the second year Bourne and Benton's *American History* was used as a history text-book, and all work through the 7A assignment was covered. The text was read and discussed in class, additional material from many sources was added. Periods which had been discussed were outlined by the class in order that they might have a comprehensive view of the period. The general plan of work was much like that used in geography, but the children did not have as much additional material to contribute. Apparently their general reading had given them less information about the early stages of American history. They were much interested in the world war; in the Current Events period many articles about it were read and discussed with enthusiasm. A few of the boys were very belligerent in their attitudes; they had evidently been thrown a great deal with adults who were extremely prejudiced and not well informed. The teacher tried tactfully to counteract this prejudiced belligerence, and some progress was made in this direction.

French. At the beginning of the second year the children started

the study of French. For a time no text-book was used, but the teacher gave them grammar and translation on the blackboard. This was later supplemented by a most delightful little book by Lady Bell, called *French without Tears*. The stories in this were read in French, translated and then dramatized in French. The children were very happy in the strange sounds of the French words; they were not at all troubled by the self-consciousness in pronunciation which sometimes attacks older students. They learned many conversational phrases, and their special delight was to improvise simple dialogs in French. During the second semester Meras' *Le Premier Livre* was used as a text, and the first year of junior high school French was covered. The author did not consider the work in this field especially good. The learning of grammar and vocabulary seemed drudgery to many of the children, and they were inclined to do it rather carelessly. Perhaps, for work in a field so new to the children, the assignments were too long and there was not sufficient review.

SPECIAL SCHOOL ACTIVITIES

The preceding discussion of subjects has been concerned with the more usual type of school work. To these subjects were added many special lines of study. Some of these were the following:

Bird-Study. This can best be described in the words of the teacher, for her knowledge and enthusiasm in this field undoubtedly had much to do with the success of this work.

There had been little real knowledge of birds among the members of the class, but by means of books, pictures, discussions, explanations, and most of all by taking trips and actually seeing birds, more actual knowledge was acquired by these children in three months' time than one would have believed possible. All those who did not have opera glasses to use bought field-glasses. Most of the children had reliable bird guides. The first bird trip was on April 25, and from that time on they were confirmed bird lovers. Two of the boys went every day during the spring; they watched nests of different birds, and made daily rounds of their "own nests," reporting progress of nests, appearance of eggs, young birds, etc. There was a collection of over two hundred large colored pictures of birds in the classroom, beside guide-books, etc. On May 8th, there was a trip to Carnegie Library to see the fine collection of mounted birds there. This helped many to identify birds they had seen.

Some measure of the results of this bird-study may be found in Chapter VII where the high average of birds listed by each child is reported.

Germination of Seeds. Window-boxes were made by the boys, filled with rich earth, and then planted with seeds. The stages in development were observed from day to day. One box was fitted with a glass front, so that root-development could be followed closely. One day the children found the glass broken all the way across the box, and they were astonished to learn that roots could exert so much pressure. One boy said he wished he "could measure the strength of that pressure!"

Excursion to See an Exhibit of Dyes. The exhibit was explained by a lecturer, of whom the children asked many questions. One of the boys who was especially interested in chemistry asked such intelligent questions that the lecturer gave him some skeins of wool and cotton and some dyes with which to experiment at home. The following is part of a stenographic account of a talk this boy gave in class about dyeing materials:

In making dyes they use the last thing that you would think of their using. They used to throw it away by the tons. They used to put it on roofs. All the dyes come in coal tar. They are called annaline dyes. Besides chemicals for dyes there are binary products. One of the highest explosives T. N. T. comes from coal tar. They get the coal tar and separate the chemicals. They organized a company and called the dyes annaline dyes. At first men used to take all the coal tar they could find, they would get it for nothing, people used to throw it away. But now it is very high priced. This man at the store told me he used to pick it up and he could see the most beautiful colors in it. Pink and orange are easy to dye. With red and yellow dyes it is more difficult.

This was followed by a detailed description of the method of dyeing with pink and orange dyes. A keen interest in textiles was the outgrowth of this excursion. One girl liked to read about fine embroideries, tapestries, etc., and she often reported to the class the results of her reading concerning the textiles in different countries.

Excursion to a Flour-Mill. One afternoon was spent in a trip through a large flour-mill, where the children followed the manufacturing process from the wheat in the railway cars, to the test loaves of bread which were baked from the finished product. Here, as always, they asked numerous and intelligent questions of the guide.

Exhibits of Electrical Apparatus. Two or three of the boys had electrical laboratories; and exhibits of apparatus from these were sometimes brought to school, and the owners explained them in a

clear and interesting way. A trip through the offices of the Ohio State Telephone Company was the result of one of the boy's talks.

The Merchant of Venice. In the spring of 1920 one of the dramatic societies of the university gave an outdoor performance of *The Merchant of Venice*, and all the children of the Special class were invited to attend the dress-rehearsal of the play. They voted this one of the pleasantest of their excursions.

The six activities mentioned give some idea of the variety of ways in which extra time was used. The attempt was made to have these special activities varied enough in character so that the different types of special interests in the class would all be represented. The children of course enjoyed all the special lines of work, and showed their appreciation by thoroughly courteous and considerate behavior whenever they were taken away from the class-room. The author is certain that a great deal of time may well be spent in bringing bright children into direct contact with industry, science and art, in such ways.

In May 1919 the children were asked to write down what part of their school work they enjoyed most and the following fields were listed: boys, nature-study, 6; writing prose, 1; arithmetic, 1; fractions, 1. Girls, nature-study, 7; Greek History, 3; arithmetic, 1; making up poems, 1.

The program of both regular and special school activities which has been listed was quite different from the kind of curriculum the author had hoped to see put into effect. She feels, however, that the one used was very well adapted to the needs and interests of the pupils. The following is the most serious criticism she brings against it. While each field of work was very well developed, there was comparatively little relationship between different lines of activity, as far as the *planned* program was concerned. A tremendous amount of relating one field to another was done, because the children and teacher always brought in many related associations. But as far as the whole program and curriculum was concerned, each subject went along by itself with less planned correlation with other subjects than one could desire. It may be that such planned correlation is not necessary with children who are so quick to see relationships. But the author fails to see why it is necessary to study the geography of Russia, the literature of England, and the history of the United States all at the same time,

instead of centering, at a given time, on the geography, literature and history of *one* country.

GREEK HISTORY

The course in Greek history was taught by the author, for one-half hour per day, three days per week. This will be described in some detail, since it is the point at which the author came into most intimate contact with the children. The aims striven for in this course were the following: It tried to place before the child problems which would stimulate his exceptional ability to see relationships between ideas. It attempted to acquaint him with the best of ancient art and literature, as a means of developing his appreciative and interpretative abilities. From the social standpoint, the course strove to help the child to come to a keener understanding and appreciation of the democratic society in which he lives. It tried to develop a clearer conception of democracy, by a study of the Greek cities, and by a comparison of ancient and modern democracies. It also attempted to develop an understanding of some of the conditions which cause a country to produce great art and literature.

The following is a brief outline of the work: I. Introduction, the concept of democracy. II. When and how did the Greek democracy begin? A. Its prehistoric history; union through war. B. The beginnings of authentic history; in Sparta; in Athens; union through laws and religions. III. How the Greek democracies were saved from the Persians; union through war. IV. How the Athenian democracy led the Greeks in the Golden Age; unity through commerce, art, literature and religion. V. How the Greek democracies fought with one another and were disintegrated; disunion through war. VI. How the Greek cities became part of a great empire; union through a king-leader. VII. Conclusion, the concept of democracy.¹

The work was carried on by means of special reports, discussions, and occasional talks or reading by the teacher. A considerable collection of books was brought together for reference work. Some children used sources they found at home or in the public library. The interest in the work varied a great deal with the type of ma-

¹ The author is indebted to Prof. F. E. Bonser for assistance in planning the work in Greek History.

terial discussed. The stirring narrative parts were naturally the most appreciated. Studies of the customs of the people, their agriculture, industry and commerce were probably enjoyed least, except as they were closely connected with some narrative.

In the field of literature, poems such as the following were moderately appreciated: Bachylides' "Peace upon earth brings Wealth and blossoms of dulcet song to birth"; Anacreon's delightful "Oh, tell me why you turn and fly, my little Thracian filly shy?"; and some of Sappho's descriptive fragments, such as "Stars around the lovely moon that glitter."¹ A metrical translation of *Alcestis* was so difficult that the children's attention wandered; but a prose account of a play of Aeschylus, with some metrical quotations, was greatly enjoyed. Some of Socrates' talks, especially his speech at his trial, were appreciated by some of the older children who seemed to like his stern morality. Stories of early Greek days, by modern authors, were much enjoyed; among these William Sterns Davis' *Victor of Salamis* and Caroline Snedeker's *The Spartan* were best liked.

Considerable time was spent on the study of sculpture, and the children became familiar with the work of Praxiteles and Phidias, and with such later Greek art as the Victory of Paeonius and the Apollo of the Belvidere. But of all types of Greek art, it was architecture that won the children's hearts. They first became familiar with the Doric, Ionic and Corinthian columns. Later the Parthenon and other famous temples were discussed in some detail. Delphi, its oracles and many temples, were of especial interest. A lecture on Greek architecture, illustrated by lantern slides, was given to the children by E. O. Christiansen, of the Art Department of the university. The boys and girls were delighted, and the "lecture" soon became an animated series of questions and answers. This interest in architecture lasted for weeks after the class discussion of it had ceased, and before the course was over, almost every public building in the city had been discussed from the architectural standpoint.

The development of the idea of what a democracy is was really enjoyed by the children. We often raised such questions as, Was this a democratic way of doing things? Do we have anything now that corresponds to that? Are we truly democratic on that

¹ The translations used were taken from W. Headlam's *A Book of Greek Verse*.

point? Some progress was made in differentiating the political, social and industrial aspects of a democracy. The children became critical of modern democracies and began to realize the ways in which they fall short of an ideally democratic society.

A considerable amount of written work was done in connection with the Greek history. After the story of the *Iliad* had been discussed each child chose some part of the story to write about; the result was a consecutive story of the whole of the *Iliad* in the children's own words. Several tests on important topics were written in class. The following questions from a test given on June 17, 1919, will illustrate the kind of work the children were able to do: (8) Explain as well as you can the difference between the Doric and Ionic types of architecture. Use drawings if you wish to do so. (11) What important things did the Olympic games do for the Greek people? (13) Which was the more democratic, Athens or Sparta? Why do you think so?

The most carefully worked out set of papers was on Greek life in the age of Pericles. A professor in the Greek department at the university had loaned us several books about this period, and the children decided to write a booklet of articles to send him, to show him what they had learned from his books. A series of important topics was suggested by the children, and each chose the one on which he preferred to write. Any child who wished to refresh his memory of the class discussion was allowed to read anything he could find on his topic, but all the writing was done in class, without books or notes. The resulting papers were read aloud and each was carefully discussed, first, as to the accuracy of the facts presented; second, as to the excellence of the expression. Each child then rewrote his paper, trying to remedy the points criticized. The resulting series of articles made a booklet of fifteen papers on eleven different topics: (1) Houses. (2) Infancy. (3) Home life. (4) Dress. (5) Slaves. (6) School days. (7) Agriculture. (8) Industries. (9) Men's amusements. (10) Politics. (11) Temples. One of these articles will be included here to give the reader some idea of the type of work the children were capable of doing at this time.

Agriculture of the Greeks, by No. 22

The farming of the Greeks was very crude. They used a long plank with one end bent straightup and the other end sharpened. Upon the bent up part was fastened a cross-piece to which the oxen were fastened. On the sharpened end was

sometimes used a metal point. Oxen were placed on each side of the large plank and hitched to the cross-piece. Oxen were the only animals used for farming at first.

Their main farm products were: wheat, barley, oats, grapes and olives. When threshing time came they made their grains ready. It was placed on a flat hard place in the ground and the oxen were made to walk on it to crush off the hulls. After the hulls were all crushed off, a slave with a flat piece of wood fastened to a pole would fan it. This was to blow away the chaff. It took a long time.

The grapes were used for wine. They were put on a flat stone and slaves would crush out the juice with their bare feet. Olives were used for olive oil and other purposes. The oil was used to burn and sometimes as medicine.

Their animals were: oxen for ploughing and drawing carts; sheep for wool; cattle for sacrifices and leather; horses for riding, war, and other sports, and dogs for protection.

When they sowed their grains the slaves sometimes used a sack with a hole in it. It was put on his back and then he would walk up and down the furrows. The slaves did most of the work. The farms were not very large. They generally had walls around them.

Like all the other subjects, the lessons in Greek history were characterized by great freedom of discussion. The most common problem was to keep four or five children from talking at the same time. The author in teaching the course made a point of presenting the most difficult material that could be given, and still hold the interest of the class. Occasionally the interest would flag and the attention of some of the children would wander. This was sometimes due to the difficulty of the material presented, but was as often due to the fact that there were not enough reference books, and too few children had been able to read on the topic under discussion. The lack of a proper background of reading or experience perhaps made a topic seem difficult which would otherwise have been easy. Many books of reference, many pictures and some models should be available for such a course. The author's general conclusion was that these children, in this field, could do work which would have been about average for a grade from two to three years ahead of the one they were in.

STENOGRAPHIC REPORT OF THE ACTIVITIES OF THE SPECIAL AND CONTROL CLASSES

The most detailed picture of work in the two classes that we possess is in the one hundred and fifty pages of stenographic report which have previously been mentioned. Certain reservations as

to the accuracy of the material must first be made. While the stenographer did good work in reporting what went on in the classes, it is certain that occasional phrases and sentences were omitted. In some instances, long speeches of the teacher were merely indicated, as "Miss —— explained ——," and the exact words were not recorded. Articles and compositions that the children read aloud were not always given in full. In the French lessons of the Special class the records were very unsatisfactory, because the stenographer had never studied French. Written lessons in arithmetic were not reported in a way that could be useful. For these reasons there were several lessons in the manuscript that have been entirely omitted. Care was taken to eliminate quite impartially from the material for the two classes, and the author feels that the portions used in various comparisons were a fair representation of the total manuscript.

Vocabulary. The ability to talk well is one of the abilities which characterizes most bright children. Part of this ability is based on size and quality of vocabulary. It was thought that the stenographic report might throw some light on the question of whether the two groups differed in ability to use words.

The first fifty pages of manuscript for each class were used in this vocabulary study. Every word used by the children was tabulated, with the exception of very common words, such as forms of the verb *to be*, *that*, *this*, *you*, etc. (These exceptions were few in number and were the same for the two groups.) The result is a carefully tabulated list of words for each group, and the frequency with which each word was used.¹ The total number of words listed for the Special class was 2240; for the Control, 1720. It is unfortunate that the number of words for the two groups was not the same, but the 1720 words should give a fair sampling of what the Control usually does. The Special group used 796 different words; the Control, 635; but since the total number used differs for the two groups these figures must be turned into a ratio before they can be compared. For every one hundred words used by the Special class, 35.5 are "different" words; for every one hundred words used by the Control, 36.9 are "different" words. Therefore, the latter group, considering the total number of words listed, used a slightly wider vocabulary than the Special. Of course, we cannot

¹ The author wishes to acknowledge the careful work of Miss Claire Sharpe, who did the tedious work of making this tabulation.

be sure that the Control class would have used as many as, or more than, 796 different words, if 2240 total words had been tabulated for them. But the evidence we have indicates that such would have been the case.

Any large difference between the two groups must be sought in difference in the quality of vocabulary. The best method we find for studying this is by the use of Thorndike's *The Teacher's Word Book*. This book is based on a study of over four and a half million words, found in a large number of books; it consists of a list of the ten thousand words most frequently used, and indicates, for each word, whether it appeared in the first one hundred, as to frequency; in the second one hundred, etc. That is, we have here, for each of ten thousand words, a measure of how often it is likely to be used in *general reading material*. Words such as *like*, *know*, *how*, *he* and *take* fall in the first one hundred; words such as *diagonal*, *discomfit* and *desperation*, in the tenth thousand. To read with understanding such words as the latter would undoubtedly indicate a higher quality of vocabulary than to read the former,—assuming, of course, that a child who could read the more difficult words would also be able to read the less difficult. The same would probably hold true for using either group of words in conversation.

With the aid of the *Teacher's Word Book*, we tabulated each of the different words listed for the Special and Control classes. The results are given in Table XXXII, as follows: number and percentage used by each class, which fall in Thorndike's first 500, second 500, second 1000, third 1000, etc. In the second part of this table we have similarly tabulated the Thorndike frequency for the total number of times each word appears; that is, if a "first 500" word was used six times by the Special children it is counted as six words of that class of words.

The percentages in Table XXXII yield data by which to compare the two groups. There are very slight differences between the two classes, with respect to different words used. The Control class use 5.5 per cent more words in the first 500, but from that point on through the tenth 1000 the differences between the groups are very slight. When we come to words that do not appear at all in the *Word Book*, we find 51, or 6.4 per cent, for the Special class, and 23, or 3.6 per cent, for the Control. There seems to be a slight tendency for the Special class to use words which do not occur

TABLE XXXII
SPECIAL AND CONTROL VOCABULARIES CLASSIFIED BY FREQUENCIES IN THORNDIKE'S *Teacher's Word Book*

	Special			Control		
	Different Words Used			Total Words Used		
	Number	Percentage	Number	Percentage	Number	Percentage
1st 500.....	299	37.5	263	43.0	1435	64.0
2nd 500.....	142	17.8	102	16.1	275	12.3
2nd 1000.....	120	15.0	105	16.6	181	8.1
3rd 1000.....	72	9.1	51	8.1	109	4.8
4th 1000.....	28	3.5	23	3.6	46	2.0
5th 1000.....	28	3.6	15	2.4	53	2.3
6th 1000.....	19	2.4	17	2.7	27	1.25
7th 1000.....	12	2.5	15	2.3	14	.6
8th 1000.....	7	.9	6	.9	10	.45
9th 1000.....	10	1.3	10	1.6	11	.45
10th 1000.....	8	1.0	5	.8	8	.35
Not in Word Book.....	51	6.4	23	3.6	71	3.2
Total.....	796		635		2240	
					1720	

frequently in general reading material. Of the words not found in the *Word Book*, many are the direct result of special lessons; for instance, in the Control list, 12 of the 23 come directly from the physiology lessons. In the Special, 7 can be traced to literature lessons; 5 to history, etc. For the Special class the first 10 words in an alphabetical list of words not found in the *Word Book* are the following: *Arcadia, allegro, alto, Aphrodite, Bassanio, bronchial, cancer, Celia, centralize, complex*. A similar list of 10 words for the Control contains: *adenoids, amphitheatre, bate, bronchial, caldron, carbohydrates, corpuscle, dioxide, dioxygen, diaphragm*.

The results for the total words used (see last four columns of Table XXXII) show very slight differences between the classes. The percentages for the first 5000 words are practically the same for the two groups, 93.5 and 93.6. For the second 5000, the percentages are 3.1 and 4.1; for words not in the *Word Book*, 3.2 and 2.2. The Control total is raised as high as this by the fact that the word *diaphragm* is used 13 times. The results for the total number of words are probably not as significant as those for different words; to use a word which has already been used does not show as much ability as the using of that word the first time.

In the Special class 55.7 per cent of the words of the vocabulary were used once only; in the Control a similar percentage was 54.7. The words most frequently used are all in very common use in ordinary speech, or else are closely related to special lesson interests. Differences which may be significant in comparing the two groups are the larger number of times the words *because, like, mean* and *think* appear in the Special frequencies.

The foregoing discussion would lead us to conclude that there are probably only very slight differences in the quality of the Special and Control speaking vocabularies here studied. The slight difference noted is in the tendency of the Special class to use more words which are very rarely found in general reading material. This problem is complicated by differences in the vocabularies of the teachers, the text-books used, etc.

Teacher and Pupil Activity. The material for analysis in the following sections was also tabulated as to the number of speeches made by pupils, by teachers, and as to the number of words spoken. This yields material for a comparison of the amount of activity of teachers and pupils. The results of this tabulation are as follows:

Special teacher: Total words, 9754. Total speeches, 620. Median length of speech, 11.4. Average length of speech, 15.7.

Special pupils: Total words, 8948. Total speeches, 748. Median length of speech, 9.9. Average length of speech, 12.0.

Control teacher: Total words, 4356. Total speeches, 313. Median length of speech, 9.1. Average length of speech, 13.9.

Control pupils: Total words, 4079. Total speeches, 329. Median length of speech, 7.3. Average length of speech, 13.9.

In the Special class the pupils speak 47.8 per cent of all the words, but they make 54.7 per cent of all the speeches, that is, their speeches are shorter but more numerous than those of the teacher. In the Control, the pupils speak 48.4 per cent of all the words, and make 51.1 per cent of all the speeches. The situation is very similar to that for the other class. There seems to be a tendency for the teacher to do about half the talking. This does not mean that half the activity of the class-room is carried on by the teacher, for our manuscript does not tell us the number of words *read* by the children, the number of songs *sung*, the number of words *written*, etc. The significant fact for our study is that in the kind of material we do have, the results for the two classes are so similar.

The interesting difference shown between the two groups is in *length* of speech, both for the teacher and the pupils. In reading the manuscript in detail the short, formal answers of the Control group contrast clearly with the longer, more informal discussion of the Special class. In the latter group, 62, or 8.3 per cent of all speeches were of one word only; in the former, 45, or 13.7 per cent, were of one word.

A tabulation, by individuals, of 579 speeches for the Special class and 269 for the Control yields data on the question, do some children talk more than others? In which groups are found greater differences in talkativeness? The average number of words spoken for each half-day of attendance for each child was computed. The results for each child and rank within each group are given in Table XXXIII.

Both groups show a tremendous range among individuals. Four children in the Special class talk more than the Control child who talks most; one in the Special talks less than the Control child who talks least. The variability in talkativeness is greater for the Special than for the Control. This may be due to differences in the intelligence distributions, but is more probably due to differences in the attitudes of the teachers of the two groups. If the data in

Table XXXIII represent the usual situation at all correctly it seems clear that some of the children were allowed to talk too much, at the expense of the other children; and this was especially true of the Special class.

TABLE XXXIII
AVERAGE WORDS SPOKEN PER ONE-HALF DAY OF ATTENDANCE

Special			Control		
Child's Number	Average Words	Rank	Child's Number	Average Words	Rank
1.....	14.6	13	5-C.....	65.9	1
2.....	24.0	6	8.....	13.75	12
3.....	9.9	15	11.....	7.0	17
5.....	77.8	1	13.....	26.2	7
6.....	....	..	18.....	55.5	4
7.....	10.3	14	29.....	2.75	18
8.....	76.1	2	33.....	27.2	6
9.....	16.3	11	35.....	29.4	5
11.....	67.1	4	4-M.....	56.5	3
12.....	16.6	9.5	5.....	10.2	15
13.....	16.2	12	7.....	13.4	13
15.....	5.5	17	9.....	15.7	11
16.....	2.6	18	11.....	7.75	16
17.....	16.6	9.5	10.....	13.0	14
18.....	9.4	16	14.....	23.0	8
19.....	20.9	8	15.....	18.1	10
20.....	71.4	3	19.....	63.9	2
22.....	21.5	7	20.....	22.2	9
23.....	45.0	5			
Av.....	28.99			25.63	
S.D.....	2.52			1.99	
Med.....	16.6			20.2	
Range.....	2.6-77.8			2.75-65.9	

Questions Asked by the Children. In our general observation of people we usually feel that the ability to see the problems presented by a situation, and to ask intelligent questions about it, is a mark of high intelligence. The recognition of a problem to be solved, and the careful defining of the problem are given by Dewey as the two first steps in the reasoning process. Applying this criterion to the

present data we may ask, "Do these children have questions in which they are sufficiently interested to ask about them in class?"

We read the stenographer's report carefully, recording each question asked by a child. We find that in the Special class, 114 questions are asked; this is 15.3 per cent of all the children's speeches considered. In the Control only 9 questions are asked, 2.7 per cent of all speeches. We have here a marked difference between the two groups, but this is probably due in part to the teachers. The Special class teacher definitely encouraged the children to ask questions. The Control teachers did not give much of such encouragement; and one of them was so very formal in her conduct of a lesson that she probably really discouraged questions.

Samples of the questions asked are of interest. The following are taken from the Special class: (1) Why do Australians send their raw materials to other countries? (2) Are there any two words in the English language that mean exactly the same thing? (3) Are there any of the big statues that Phidias made still in existence? The following questions are from the Control: (1) How do they measure air? (2) Do they have mines there in central Africa? (3) Aren't short skirts easier to run in?

A classification of the questions asked reveals the following: In the Special class, 18 questions are about how to proceed in class work; 23 are of word usage, meaning or pronunciation; practically all of the remaining 71 questions are concerning facts or inferences. In the Control, of the 9 questions asked, 2 are of class procedure, and 2 are of word pronunciation and meaning.

All of the questions in the Control class were asked by 4 children. The I.Q.'s of three of these children are known: 103, 105 and 122. All but three of the Special class children are credited with questions. The I.Q.'s of the 5 children who asked the most questions (a total of 62) are 121, 129, 134, 142, and 150.

It seems probable that even though both groups had been taught by the same teacher, the Special children would have asked more questions of better quality than the Control.

Spontaneous Suggestions for Solution of a Difficulty. Another indication of ability to think well is the tendency to have many relevant suggestions for solution of a difficulty. One of the purposes of the teacher's questions is to get from the children solutions of difficulties. It would not be fair to compare the two groups on the basis of answers to teacher's questions, however, because the

teachers differ so much in the kind and number of questions asked. We may compare them on the basis of suggestions which are spontaneous,—those which are not directly the result of a teacher's questions. The Special children make 36 suggestions, 4.8 per cent of all speeches. The Control make 12, or 3.6 per cent of all speeches. The difference here in number is not great. We will list a few representative suggestions from each group, to help indicate possible differences in quality. *Special*: (1) I should think that string that was used for shades would be better (for a kite string) because it gives more. (2) Why not have just one language instead of many national languages? (3) I should think they would tax the people who had shops and market places (to get revenue in ancient Greece). *Control*: (1) We don't keep good time (to explain poor singing). (2) When I am on the car by myself I always go up to the front (to get better air). Ten of the suggestions in the Special class were made by one boy; the others are distributed among 12 children. In the Control, 8 children contribute the 12 suggestions. The Special class "solutions" are, in general, less directly suggested by what has been said by the teacher or some other pupil.

Amount of Information Volunteered. Children in school often volunteer information which does not bear directly on any difficulty, but is simply told because the child enjoys imparting his own information to others. Material has been classified as "volunteered" if it is not given directly in answer to a question from the teacher or some other pupil. If several children answer a single question asked by the teacher, none of this is classified as "volunteered."¹ A tabulation of such speeches yields 232, or 31.2 per cent of all speeches for the Special; and 66, or 19.8 per cent of all speeches for the Control.

A classification was made within this group of speeches, to indicate their general character. The number of speeches in each class, and the percentage of the total number of speeches is given in Table XXXIV for both groups. The significant difference between the groups is to be found in the higher Special percentage for information which is evaluation or inference.

There is also a difference in the quality of information which cannot be stated in numerical terms. Characteristic examples of this

¹ A single speech might be classified under several headings, as "solution of a difficulty," "volunteered," "criticism," etc.

TABLE XXXIV
INFORMATION VOLUNTEERED

	Special		Control	
	Number	Percentage	Number	Percentage
Jokes and stories	4	0.5	1	0.3
Ideas from reading	52	7.1	25	7.5
Ideas from child's own obser- vation	65	8.8	27	8.1
Criticism	20	2.7	7	2.1
Evaluation of ideas	19	2.6	0	0
Inference from facts observed	24	3.2	1	0.3
Miscellaneous	52	6.5	5	1.5
Total	232	31.2	66	19.8

kind of speech from the two groups are as follows *Special*: (1) If we let certain immigrants in and make the others stay out, we might just keep out the ones that would make the best citizens. (2) I read that it takes 30 square feet of sand to purify water. (3) It's just the opposite now; people who work look down on those who don't work. (4) I want to go to Canada to improve the little car that goes over the falls. It pulls by a rope now and I think I could fix a better way, or maybe there is something I could improve. *Control*: (1) Children of India are married when they are ten years old, and if they are fifteen they are said to be old maids. (2) I know a lady who was operated on and she has only one lung. (3) Where I went to school they gave me a pamphlet with words that shouldn't be used.

In the Control 40 of the 66 speeches volunteered were made by four children. The I.Q.'s of two of these are 105 and 122; a third had been "skipped" into the class from a lower grade because of her high ability. In the Special class 149 of the suggestions were volunteered by the five children who were mentioned in connection with the "Questions." The difference between the two groups as to information volunteered is conditioned by the attitudes of their teachers toward such volunteering.

Criticism. The ability to criticise suggestions made by others or by one's self is an important part of ability to think well. We

have tabulated the number of critical remarks made by each group, with results as shown in Table XXXV.

TABLE XXXV

	CRITICISM			
	Special		Control	
	Number	Percentage	Number	Percentage
Of people.....	13	1.7	1	0.3
Of ideas.....	39	5.2	6	1.8
Of words and sentences.....	10	1.3	14	4.2
Of self.....	10	1.3	4	1.2
	—	—	—	—
Total.....	72	9.7	25	7.5

The high percentage of criticism of words and sentences in the Control group is the direct outcome of work in the language lessons, and was called forth by the teacher's suggestions. The criticism of people by the Special children, with possibly two exceptions, is very impersonal. The significant difference between the two groups is in the percentage of criticism of ideas, for it is this type of criticism which is of essential importance in the thinking process.

Confusion of Association. How many times do the children have incorrect associations? The number recorded is small for both groups, but this may have been one of the instances where the stenographer failed to record everything that went on in the class. An incomplete or incorrect answer might easily be stopped so quickly by the teacher that the stenographer would fail to get it down. Samples of what have been included under confusion of association are: (1) Defining a complex instead of a compound sentence. (2) Describing grafting when a description of pruning was called for. (3) Stating that Phidias' statue of Zeus was at Delphi. (4) Saying that Fulton did certain things which were actually done by Watt. A tabulation of such confusions for the Special yields 23, or 3.1 per cent of all speeches; for the Control, 15, or 4.5 per cent. If the stenographer's record represents the actual situation, the number of confused associations is surprisingly small for both groups.

Irrelevant Speeches. In reading the manuscript of both groups it is evident that speeches are made that are irrelevant to the material under discussion. A lesson in French may be interrupted by a question about birds; or an arithmetic lesson may be suddenly interrupted with a newspaper account of discoveries in the Arctic

Zone. In the following tabulation all speeches have been called irrelevant which would tend to "side-track" the discussion in progress. If the speaker does succeed in side-tracking the discussion for more than three or four speeches, the remarks following his are not classified as "irrelevant." We find 43 such irrelevant speeches made by the Special class, 5.8 per cent of all speeches made; and 17 by the Control, 5.1 per cent of all speeches. The difference in percentage of such speeches is not great, but the speeches of the special children tended to be *more* irrelevant than those of the Control. We have here again evidence for a much wider field of association in the bright than in the average children.

A record was also made of the number of times the discussion was "side-tracked" for more than three children's speeches. In the Special class this happened 6 times; the total number of speeches of such material unrelated to the general trend of discussion was 66 (8.9 per cent of all speeches), divided among the 6 "side-trackings" as follows: 17, 20, 6, 4, 13, 6. (These figures do not include the teacher's speeches.) When 20 of the children's speeches in a lesson are unrelated to the material of the lesson, it means that the period had been usurped by the new material. In the Control class, discussion was thus side-tracked only one time, of 11 speeches (2.3 per cent).

This matter of irrelevant speeches is of such importance that we analyzed from this standpoint all the notes on class discussions taken down by the author. Of Special class children, 445 speeches yielded 25 irrelevant speeches, or 5.6 per cent. For the Control, 238 speeches gave 8 irrelevant speeches, or 3.4 per cent. In neither class was any serious "side-tracking" noted.

The data we have on this point serve as a corroboration of the author's very definite impression that a considerable amount of the Special children's time was spent in talking about material unrelated to the particular problems under discussion. This was certainly more true of the bright children than of the Control class. If this is a defect in the Special class work it is one that grew directly out of the teacher's aim for the class. In her desire to use the children's own interests and to develop their individuality she consciously allowed them to change the trend of discussion. Breadth of association is certainly desirable; but the ability to limit associations to those which are relevant to the problem waiting for solution is an essential element in efficient thinking.

Summary of the Stenographic Report. The following conclusions are the results of the preceding analysis. We can only guess as to whether they would be characteristic of all the class-room activities of the two classes.

1. In size of vocabulary used, the two groups are practically the same. In quality of vocabulary, the two groups are very similar, but the Special group are more likely to use words which occur only rarely in general reading material.

2. The ratio of teacher to pupil activity is practically the same for the two classes.

3. The median length of speech for the Special class is greater than that for the Control.

4. The Special class asks many more questions,—15.3 per cent as opposed to 2.7 per cent for the Control.

5. In spontaneous suggestions for solutions of a difficulty the two groups are very similar.

6. The Special class volunteer much more information than do the Control, and a larger percentage of this may be classified as evaluation and inference.

7. The number of critical remarks made is slightly greater for the Special than for the Control, and there is a still greater difference in criticism of ideas.

8. The amount of confusion of association is small for both groups.

9. The percentage of irrelevant remarks is somewhat higher for the Special class, and the amount of "side-tracking" of discussion is much greater.

The value of the foregoing conclusions is conditioned by the difference in the attitude of the teachers of the two groups. The author feels certain that the larger part of the differences found are due to differences in the children, but some of them are undoubtedly due to differences in the teachers.¹

To this discussion of class-room activity may well be added a few notes as to characteristics of the class-room work, which are

¹ The second I.Q. of No. 18 of the Control class was 122. If all her speeches are omitted from the Control records, the Control percentages are decreased by the following amounts: number of questions asked, by 0.7 per cent; suggestions for solution of a difficulty, 0.65 per cent; information volunteered, 1.1 per cent. That is, comparisons of Special and Control based on these percentages are more favorable to the Special class than are comparisons based on data including No. 18. The changes made by the omission of the speeches of No. 18 from the lists of criticism, irrelevant remarks and confusions of association are so small as to be negligible.

based on the observations of the teacher and the author. The teacher mentions the following as especially characteristic of the children's work: marked language ability; willingness to talk; independence in undertaking and carrying on work; ability to work for a long time at complicated work without losing interest; wealth and variety of associations; enthusiasm; appreciation of the beautiful; desire for approval; knowledge of things occurring in the world. The author would agree entirely with this list; and would emphasize especially the following: ability to talk in an interesting and effective manner; vivid interest in a great variety of topics; enthusiasm; ability to work independently; great variety of associations.

CHAPTER VII

INTERESTS AND AMBITIONS OF THE SPECIAL AND CONTROL GROUPS

IF one wishes to have an insight into the mentality of bright children, it is not enough to measure them with mental and educational tests, and to keep a careful record of their class-room work. It is also particularly desirable to know certain things about their extra-school activities and interests. What do they read? Do they play outdoor games? What are their ambitions? There are a dozen similar questions to which we would like to know the answers. The present chapter will present some data on the problem of the children's ambitions and interests as shown in certain questionnaires and lists which they wrote. We will first present the topics on which we have material from both the Special and Control Groups. This will be followed by a small amount of data for the Special class alone.

In the series which was given to the Special and Control Groups an attempt was made to sample varied fields of interest in the hope of finding some characteristic differences between the two groups. The instructions for each of the ten different lists written were as follows:

Write a list of

- I. All the tools and machines you can name when you see them.
- II. All the kinds of cloth you can name when you see them.
- III. All the birds you can name when you see them.
- IV. All the flowers you can name when you see them.
- V. All the games you know how to play.
- Va. If you had an hour's leisure time to spend in outdoor amusement, how would you prefer to spend it? If you had an hour's leisure time to spend in indoor amusement, how would you prefer to spend it? Which do you enjoy more, the outdoor amusement just mentioned, or the indoor amusement?
- VI. All the plays you have seen which were not moving-pictures.
- VII. All the actors and actresses you can, who are not in moving-pictures alone. All the musicians you can.
- VIII. All the moving-picture actors and actresses you can name.
- IX. All the magazines you usually read each week or month. Put a figure (1) in front of the magazine you enjoy most. Put a figure (2) in front of the magazine you enjoy next most.

- X. As many of the books you have ever read as you can. You may include books that have been read aloud to you. Give the name of the author of the book if you can. When you have finished, put a figure (1) in front of the book you liked best; a figure (2) in front of the book you liked next best; a figure (3) in front of the book you liked next best; a figure (4) in front of the book you liked next best; and a figure (5) in front of the one you liked next best.

No time-limit was used, except that in the case of "flowers" the papers were collected at the end of 20 minutes. None of the lists required more than 30 minutes, and some were completed in 5 minutes. All of the data were obtained during the spring of 1920. The exact date on which each list was written, and the number of children present in each group, are shown in Table XXXVI.

TABLE XXXVI
DATES ON WHICH LISTS WERE WRITTEN;
NUMBER OF CHILDREN PRESENT FOR EACH LIST

List	Date	Special		Control	
		Boys	Girls	Boys	Girls
I.....	4-26	11	5	4	16
II.....	4-26	11	5	4	16
III.....	3-22	11	7	4	13
IV.....	3-29	11	5	4	14
V.....	3-29	10	7	4	13
VI.....	5- 3	11	7	4	14
VII.....	5- 3	11	7	4	14
VIII.....	4-14	11	6	4	16
IX.....	3-22	11	7	4	13
X.....	3-15	9	6	7	16

After the lists in any set had been written, they were treated as follows: an alphabetical list of all the objects (or people, or books) written was made for each group. The number of times any object was mentioned was recorded, and this was done for boys and girls separately.¹ This last was necessary because the Special group had more boys than girls, while the Control had more girls than boys.

The foregoing alphabetical lists with their frequencies were, in each set, summarized as follows: A. The number of *different* kinds of objects (tools, for instance) mentioned, and the average number of different objects per child. B. The total number of objects

¹ Except in the case of flowers, where boys' and girls' lists were not treated separately.

TABLE XXXVII
TABULATION OF RESULTS OF CHILDREN'S LISTING OF OBJECTS, PLAYS AND PEOPLE

A. Different Kinds of Objects, Plays and People Listed.										B. Total Number of Objects.																			
Special					Control					Ratio of Special to Control					Special					Control					Ratio of Special to Control				
	Boys	Girls	All		Boys	Girls	All		Boys	Girls	All		Boys	Girls	All		Boys	Girls	All		Boys	Girls	All		Boys	Girls	All		
<i>Tools</i>																													
Total.....	149	63	168	53	89	112	...	...	...	...	...	332	112	444	92	257	349	...	...	...	...	...	...	...	...	...	...
Average.....	13.5	12.2	6.9	13.3	5.6	5.6	1.0	2.2	1.9	30.2	22.4	27.8	23	16	17.5	1.3	1.4	1.6	...	...	...	...	...	...	...	...	...
<i>Fabrics</i>																													
Total.....	27	34	42	12	62	62	...	...	...	...	...	96	87	183	19	289	308	...	...	...	...	...	...	...	...	...	...
Average.....	2.5	6.8	2.6	3.0	3.9	3.1	.8	1.7	.8	8.7	17.4	11.4	4.75	18.1	15.4	1.8	1.0	.7	...	...	...	...	...	...	...	...	...
<i>Birds</i>																													
Total.....	122	61	139	28	36	41	...	...	...	...	...	326	163	489	56	144	200	...	...	...	...	...	...	...	...	...	...
Average.....	11.1	8.7	7.2	7	2.8	2.4	1.6	3.1	3.0	29.6	23.3	27.3	14	11.1	11.8	2.1	2.1	2.3	...	...	...	...	...	...	...	...	...
<i>Flowers</i>																													
Total.....	...	...	114	...	...	103	...	...	...	...	...	...	...	...	...	...	503	...	...	...	...	...	...	...	...	...	...
Average.....	...	...	7.1	...	...	5.7	...	...	1.2	...	...	...	...	...	...	27.9	...	...	...	...	...	...	...	...	...	...	1.0
<i>Games</i>																													
Total.....	108	112	177	54	137	163	...	...	...	...	...	235	214	449	91	291	382	...	...	...	...	...	...	...	...	...	...
Average.....	10.8	16.0	10.4	13.5	10.5	9.6	.8	1.5	1.1	23.5	30.6	26.4	22.8	22.4	22.5	1.0	1.3	1.2	...	...	...	...	...	...	...	...	...
<i>Plays Seen</i>																													
Total.....	19	27	42	4	37	38	...	...	...	...	...	21	40	61	4	47	51	...	...	...	...	...	...	...	...	...	...
Average.....	1.7	3.9	2.3	1.3	2.5	2.1	1.3	1.6	1.1	1.9	5.7	3.4	1.3	3.1	2.8	1.5	1.8	1.2	...	...	...	...	...	...	...	...	...
<i>Movie Actors</i>																													
Total.....	97	78	126	52	97	106	...	...	...	...	...	221	156	397	104	340	344	...	...	...	...	...	...	...	...	...	...
Average.....	8.8	13	7.4	13	6.1	5.3	.7	2.1	1.4	20.1	26	22.2	16	21.3	22.2	.8	1.2	1.0	...	...	...	...	...	...	...	...	...
<i>Magazines</i>																													
Total.....	29	12	33	12	21	27	...	...	...	...	...	69	26	95	14	39	53	...	...	...	...	...	...	...	...	...	...
Average.....	2.6	1.7	1.8	3	1.6	1.6	.8	1.1	1.1	6.3	3.7	5.3	3.5	3	3.1	1.8	1.2	1.7	...	...	...	...	...	...	...	...	...
<i>Books</i>																													
Total.....	359	211	520	118	227	314	...	...	...	...	...	497	299	796	152	379	531	...	...	...	...	...	...	...	...	...	...
Average.....	40	35.2	34.7	16.9	14.2	13.7	2.4	2.5	2.5	55.2	49.8	53.1	21.7	23.7	23.1	2.5	2.1	2.3	...	...	...	...	...	...	...	...	...
<i>Authors</i>																													
Total.....	60	30	72	18	22	35	...	...	...	...	...	156	92	248	20	71	91	...	...	...	...	...	...	...	...	...	...
Average.....	6.7	5.0	4.8	2.6	1.4	1.5	2.6	3.6	3.2	17.3	15.3	16.5	2.9	4.4	4	6.1	3.4	4.2	...	...	...	...	...	...	...	...	...

(e.g., tools) listed, and the average number per child. The results for the two groups in each set were compared as follows: for both the "different objects" and the "total objects," we computed how many the Special class listed for every one listed by the Control. For example, in different kinds of tools the Special class boys list one tool for every one listed by the Control; but the Special class girls list 2.2 for every one listed by the Control girls. The totals, averages and ratios for different objects and total number of objects are shown in Table XXXVII.

In each group, for each set, there were many objects which were mentioned only once. It was thought that these might give some indication of diversity of association, which could be compared for the two groups. Data as to objects mentioned only once are given in Section A of Table XXXVIII.

TABLE XXXVIII

VARIETY OF ASSOCIATIONS IN SPECIAL AND CONTROL GROUPS, AS SHOWN
IN LISTS OF OBJECTS

A. PERCENTAGE OF OBJECTS LISTED ONCE ONLY

	Special	Control	Samples of Objects Listed Once Only
Birds.....	10.4	7.0	rice-bird, raven, vulture.
Books.....	51.8	43.2	
Fabrics.....	7.7	7.5	galatea, tulle, zibeline.
Flowers.....	10.2	6.6	anemone, cosmos, orchid.
Games.....	22.5	25.4	hockey, hound and hare, penochle.
Tools.....	21.4	16.0	adze, sickle, crowbar.
Movie Actors.....	48.4	38.7	

B. NUMBER AND PERCENTAGE OF OBJECTS COMMON AND NOT COMMON TO EACH GROUP

	Number			Percentage		
	Common	Special Only	Control Only	Common	Special Only	Control Only
Birds.....	36	94	5	28.1	69.6	3.7
Books.....	74	446	240	9.7	58.7	31.6
Fabrics.....	28	9	34	38.9	12.6	47.9
Games.....	69	108	94	25.4	39.8	34.7
Flowers.....	66	47	37	44.0	31.3	24.7
Tools.....	65	103	47	30.2	47.9	21.9
Movie Actors.....	64	60	44	38.1	35.7	26.2

The slight difference between the two groups is in favor of the Special class. By far the greatest variety is shown in the fields of

moving-picture actors and books. In Section B of Table XXXVIII are shown the number of different objects named by each group, and not by the other, and the number common to both groups. These are also stated in terms of percentages of the total for both groups combined. These figures indicate again the differences in variety of objects listed, depending on the field under investigation. It also shows clearly the greater breadth of the associative field of the Special group.

In Table XXXIX are presented lists of the objects, books, etc., listed most frequently by each group. These give data as to the most frequent associations in any one class of objects, and the reader may compare the two groups on this point.¹

TABLE XXXIX

OBJECTS, PEOPLE AND BOOKS MOST FREQUENTLY MENTIONED

Tools and Machines (16-20)||

Special		Control	
hammer	14	hammer	20
bit	13	screw-driver	18
chisel	12	saw	14
brace	10	file	12
file	10	chisel	11
screw-driver	10	can-opener	9
plane	9	hatchet	9
saw	9	sewing-machine	9

Fabrics (16-20)

silk	15	silk	20
linen	13	satin	19
gingham	12	calico	16
velvet	12	serge	16
satin	10	gingham	15
cheesecloth	9	linen	15
cotton	9	voile	14
		cheesecloth	14

|| First number indicates the number of Special children who wrote this list; second number, the number of Control children.

¹ On this question of most frequent items in various lists, the following source of error should be noted. At first it was difficult to keep the children from asking such questions as, "Is —— all right to put down?" If a flower, for instance, were mentioned so that the other children heard it, they were all sure to add that flower to their own lists. The list of flowers was one of the first written and probably suffers more from this error than the other lists.

TABLE XXXIX—*Continued*

<i>Birds (18-17)</i>			
Special		Control	
robin	18	sparrow	17
meadow lark	17	robin	15
blue-bird	17	blue-jay	15
pigeon	17	redbird	15
blackbird	15	bluebird	14
scarlet tanager	13	blackbird	11
flicker	13	canary	10

<i>Flowers (16-18)</i>			
violet	16	violet	18
rose	16	rose	18
sweet-pea	14	tulip	18
nasturtium	14	geranium	17
daisy	13	lily of the valley	16
dandelion	13	dandelion	14
pansy	13	poppy	14

<i>Games (17-17)§</i>			
socker ball	17	hide and seek	16
base ball	14	tag	14
hide and seek	14	black man	12
finch	13	checkers	9
parchesi	12	dominoes	9
checkers	12	finch	9
volley ball	11	parchesi	9

<i>Plays Seen (18-18)</i>			
Birds' Christmas Carol	6	Every Woman	3
The Wayfarer	6	Freckles	3
Little Princess	3	Huckleberry Finn	3*
		Tom Sawyer	3*

<i>Actors and Musicians (18-18)</i>			
Caruso	12	Caruso	2
Schumann-Heink	6	Fern Rogers	2
Mary Garden	5	Margaret Cooper	2
Galli Gurci	4		
Theda Bara	4		

§ Some of these high frequencies may have been caused by the season of the year (March) when certain out-door games had an especial charm.

* Probably a moving-picture.

TABLE XXXIX—*Continued*

Moving-picture Actors (17-20)

Special		Control	
Charlie Chaplin.....	17	Charlie Chaplin.....	19
Mary Pickford.....	17	Fatty Arbuckle.....	18
Douglas Fairbanks.....	16	Douglas Fairbanks.....	18
Jack Pickford.....	15	Mary Pickford.....	18
Fatty Arbuckle.....	12	Marguerite Clarke.....	16
Wm. S. Hart.....	12	Jack Pickford.....	14
Wm. Farnum.....	11	Charles Ray.....	13
Charles Ray.....	11	Dorothy Gish.....	12
Wallace Reid.....	11	Billie Burke.....	12

Magazines (18-17)

<i>Boys</i>		<i>Boys</i>	
American Boy.....	9	American Boy.....	2
Saturday Evening Post.....	7	Saturday Evening Post.....	2
Literary Digest.....	6		
Popular Mechanics.....	5		
<i>Girls</i>		<i>Girls</i>	
Pictorial Review.....	6	Ladies' Home Journal.....	6
St. Nicholas.....	5	Little Folks.....	4
		Saturday Evening Post.....	4

Authors (15-23)

Victor Appleton.....	24	Mary M. Dodge.....	13
Shakespeare.....	20	Laura Lee Hope.....	10
Louise Alcott.....	19	Louise Alcott.....	8
Horatio Alger.....	17	Daniel Defoe.....	5
Edgar L. Burroughs.....	15	Sophie May.....	5
Mark Twain.....	13	Eleanor H. Porter.....	5
R. L. Stevenson.....	9	Margaret Sydney.....	5

Books (15-23)

(Read Aloud to Class)			
Victor of Salamis.....	14	Just David.....	18†
Just David.....	14	Hans Brinker.....	17†
Primrose Ring.....	12	Robinson Crusoe.....	11
Boris in Russia.....	12	Donald and Dorothy.....	9
Michael O'Halloran.....	10	Alice in Wonderland.....	9
Little Women.....	9	Pretty Polly Perkins.....	8
Young Visitors.....	9	Peterkin Papers.....	8‡
Hans Brinker.....	8	Robin Hood.....	7

† Read Aloud to the class.

‡ Probably read aloud to the class.

TABLE XXXIX—*Continued*

Special		Control	
Merchant of Venice	8	Black Beauty	7
Black Bruin	8	Our Little Italian Cousin	6
Twelfth Night	7	Little Women	6
Tom Sawyer	6	Little Men	6
(Not Read Aloud to Class)			
Huckleberry Finn	6		
Arabian Nights	6		
Andersen's Fairy Tales	6		
Book of Knowledge	5		
Little Men	5		
Pollyanna	5		
Tarzan of the Apes	5		
Tom Swift stories	5		

Preferred Books (15-23)

<i>Boys</i>		<i>Boys</i>	
Tarzan series	6	Just David	3
Wild Animals I Have Known	2	Robin Hood	2
Michael O'Halloran	2	Robinson Crusoe	2
<i>Girls</i>		<i>Girls</i>	
Just David	3	Just David	10
Pollyanna	3	Hans Brinker	7
Little Women	2	Little Women	3
		Pretty Polly Perkins	3

We will now discuss briefly each one of the ten different kinds of lists, in connection with the data given in Table XXXVII.

1. *Tools and Machines.* The tools listed ranged all the way from a can-opener to a linotype, from a trowel to a reaper. In some cases several varieties of a given class were mentioned. Most of the Control boys were older than the Special boys, and had had the advantage of longer experience with tools at home, etc. But the Special boys had had more work in manual training at school.

The Special girls are more superior to the Control girls than the Special boys are to the Control boys. The Control boys have a much greater advantage over the Control girls than do the Special boys over the Special girls.

2. *Fabrics.* The number of fabrics mentioned is not nearly as large as the number of tools. There is practically no tendency to mention different varieties of a given class, as occurred in the case

of tools. In three out of six comparisons the Special is inferior to the Control; in one it is equal, and in two superior. In fabrics the Special boys do not do as much better than the Control boys, as the Special girls did better than the Control girls in tools. Clearly, bright girls are more interested in tools and machines than bright boys are in fabrics.

3. *Birds*. The Special class knows three times as many different kinds of birds as the Control. In total number of birds listed they do twice as well. Part of this difference can undoubtedly be explained by the special study of birds which the Special class made in the spring of 1919, and continued during the spring of 1920. (See Chapter VI, page 117.) Some attention was given to the spring birds in the Control class-room, but not nearly as much as that resulting from the vivid enthusiasm of teacher and pupils in the Special class. Unfortunately, we do not know just how much of the difference found is due to this special study.

4. *Flowers*. The Special class lists more different kinds of flowers than the Control, but in total number listed the two groups are practically equal. Both average lists quite as long as the author had expected.

5. *Games*. In both different kinds of games and in total number listed the Special girls are best, a superiority which we might not have predicted. The total number of different games included in the lists for both groups is 271, a surprisingly large number.¹ During the year 1919-20, the children in N School had a special teacher of games who had probably added much to their experience in this field.

Some of the games listed are primarily indoor games, while others are primarily outdoor games. All games, except those listed only once, were classified from this standpoint, in order to learn whether there was any difference between the two groups with respect to the proportion of each listed. The percentages of outdoor and indoor games were as follows: Special, boys, 67, 33; girls, 52, 48; all, 60, 40; Control, boys, 71, 29; girls, 58, 42; all, 61, 39. Each group lists more than half outdoor games, and when

¹ Undoubtedly some of these are cases of the same game being designated by slightly different names. For instance, the author is under the impression that "New York" and "New Orleans" are exactly the same game, except for the difference in the one word. In the former, one side comes from "New York," in the latter, from "New Orleans." The same game is called "Lemonade" in some localities.

both boys and girls are combined in a single measure, there is practically no difference between the two classes.

An attempt was made to select from each group's list the games which require that the players *think well* in order that they play the game well. Sixteen different games fell in this class for the Special group, and six for the Control. A total of 31 such games in the former group, and 26 in the latter were mentioned.

Preferences in Amusement. The lists of preferred outdoor amusements do not yield any significant differences between the two groups; this may be due to the different proportions of boys and girls. The lists for the two classes are quite dissimilar; of 10 different outdoor amusements listed by the Special class and 14 by the Control, only 4 are common to both. In preferred indoor amusements 7 different things are listed by the Special and 14 by the Control. These include such occupations as playing cards, checkers, making an aeroplane, dressing dolls and reading. The significant difference is that 65 per cent of the Special class give reading as preferred indoor amusement, but only 36 per cent of the Control group so list it. Ninety-four per cent of the Special, and 80 per cent of the Control, prefer the outdoor amusements. This decided liking for outdoor activities may have been due in part to the fact that to play outdoors in the spring weather, after long winter days indoors, had a particular charm.

6. *Plays Seen.* The lists of plays seen showed a strange mixture of local school plays, moving-pictures, musical comedy, and a few dramas of real merit. Such plays as the following were mentioned: Parlor, Bedroom and Bath; Penrod; Chimes of Normandy; Twelfth Night. The Special list contained the following plays of merit: The Bluebird; Midsummer Night's Dream; Richelieu; Taming of the Shrew; Twelfth Night. The only play listed by the Control which could be placed in this class was Peter Pan. It must of course be remembered that the quality of the plays seen would probably depend more on the preference of the children's parents and the money available for recreation, than upon the real interest of the children.

7. *Actors and Musicians.* The lists include players in local stock-companies, movie stars, authors, magicians, lecturers, and a few well-known actors and musicians. In the Special class 59 actors and musicians of established reputation were mentioned, while in the Control, only 9 of such reputation were listed. During

the time that the Special class was in session in N School, many good actors and actresses played in Columbus; among them were such people as George Arliss, Robert Mantel, Mrs. Fiske and Maude Adams. The lack of information as to actors and musicians shown by both groups is of interest mainly as a contrast to the data about moving-picture actors.

8. *Moving-picture Actors.* The children went at the writing of names of moving-picture actors with a will, for it touched on a matter of great interest to them. In the same city block as N School was a small moving-picture theatre which usually had fairly good pictures. It was not only a theatre where one went to see a picture, but also a place where one had a neighborly time. There were probably many families who saw almost every picture that was shown.

The resulting lists had to be carefully checked for errors. The most frequent was the giving of the same name in several slightly different forms; for instance, June Caprice appeared as June KPriest. Producers and authors also were listed as actors. Names which were not those of moving-picture actors were eliminated.¹ Twenty-two such incorrect names were crossed off; of these 2 were listed by the Special and 20 by the Control; but 12 of the latter were in one child's list.

In different actors listed the Special class is a little better than the Control, but in total number the two groups are equal. The names of actors most frequently mentioned may give some indication of the type of actor and picture that appeal to children of this age. (See Table XXXIX.)

In order to learn whether the number of times the children went to the moving-pictures had any influence on the number of names listed, they were asked to write down the average number of times per week they attended the movie theatres. The resulting figures are of course not very accurate, but they should give some indication of how often the children really go. In the Special class, the number of times range from three times a year to four times a week. The medians are, for the boys, once a week; for the girls, twice a week; for all once a week. In the Control, the range is from "never goes," to twice a week. The medians are, for boys, once a week; for girls, once in two weeks; for all once a week. The

¹ The author is indebted to the Question and Answer Department of the *Photoplay Magazine* for checking a doubtful list of 37 names.

important difference is that the Special girls go oftener than the Control girls; the influence of this is probably seen in the greater number of different actors named by the Special girls.

Perhaps for us the most significant thing in the foregoing discussion lies in the tremendous amount of time which the bright children have probably spent in the moving-picture theatres, in order to be able to name so many actors. Questions that the teacher of gifted children may well consider are such as the following: Should we try to dissuade the children from going to the movies so often? If so, how should they spend the time gained? Should we try to direct them to certain kinds of pictures? What ideas and attitudes do children gain from the movies? These questions might, of course, be asked concerning all children, but they seem to the author especially significant in the case of the gifted.

9. *Magazines.* The lists of magazines contained only bona fide magazines. Perhaps one or two lists were the result of a child's saying he "usually" read a magazine which he really read only occasionally, but it is not likely that this was a large source of error. The important difference between the two groups is in the type of magazine read. We have classified the magazines listed under several general headings and have found the number of each read by the boys and by the girls in each group. These, in terms of percentages of total number read, for the separate group, are shown in Section A of Table XL.

The most marked differences found for the boys are the much greater number of magazines of history and science read by the Special boys, and the greater number of adult story magazines by the Control boys. In the case of the girls, the two lists are much more alike; the only marked difference is that the Special girls read more children's general magazines, while the Control girls read more adult's general. The most advanced type of reading is probably that done by the Special boys. In considering the significance of these comparisons, it should be remembered that the results are considerably influenced by the kind of magazines bought by the parents.

If we tabulate the answers to the questions as to what magazines are liked best, counting first and second choice as equal, and then classify them, the results are as shown in Section B of Table XL. The important points suggested by these figures are the high preference shown for children's general magazines by all the children,

TABLE XL
CLASSIFICATION OF MAGAZINES READ, AS TO TYPE OF CONTENT

Type of Magazine	A. Percentages for Each Group Which Fell in a Given Class				B. Best-liked Magazines Classified as to Kind			
	Boys		Girls		Boys		Girls	
	11 Special	4 Control	7 Special	13 Control	Special	Control	Special	Control
1. Art and Literature.....	1.4	0	0	0	1	0	0	0
2. History and Current Events.....	21.8	7.1	11.5	10.3	1	1	1	1
3. Science.....	23.2	0	0	2.5	7	0	0	0
4. Humor.....	5.8	0	0	5.1	0	0	0	0
5. General.....								
a) Children's.....	20.3	28.6	34.5	2.5	9	4	6	1
b) Adults'.....	17.4	21.3	7.7	17.9	3	0	0	4
6. Story.....								
a) Children's.....	0	0	3.8	10.3	0	0	1	3
b) Adults'.....	1.4	21.3	7.7	12.8	0	0	1	2
7. Women's.....	8.9	14.3	34.5	38.5	0	0	3	7

Samples of magazine in each class are as follows: (1) *Mentor*. (2) *Literary Digest*. (3) *Popular Mechanics*. (4) *Life*. (5a) *American Boy*. (5b) *American Magazine*. (6a) *Little Folks*. (6b) *Cosmopolitan*. (7) *Pictorial Review*.

except by the Control girls; the high place of science with the Special boys, and the high place of women's magazines with both groups of girls.¹ The best liked magazine for Special boys is the *American Boy*; for Special girls, *St. Nicholas*; for Control boys, the *American Boy*; for Control girls, the *Ladies' Home Journal*.

10. (a) *Books*. The amount of material in the book-lists was so large that it is difficult to give the reader any idea of the variety of the lists written by both classes. The fact that the instructions were to list all the books they had *ever* read added to the wealth of the lists. This requirement also means that the results will vary somewhat according to the excellence of the child's memory. The Special class undoubtedly have an advantage in excellence of memory, but the question of how long one remembers what has been read is probably an important factor in deciding the ultimate value to the reading, and therefore we do not think that the inclusion of the memory element adds an irrelevant factor. Among other elements that would enter into the listing of books are the recency of the reading and whether the child owns the book or not.

In variety of reading the Special class covers almost two and one-half times as varied a field as the Control class. The data on variety of reading in Section B of Table 38 serve to emphasize the extremely varied fields covered by both groups. Of the 760 different books listed by the two classes only 74, or 9.7 per cent are common to both. In total amount of reading the Special reads more than twice as much as the Control.

We are concerned not only with the amount and variety of reading done, but also with the kind and quality. To classify or rate every one of the 760 books listed is beyond the scope of this thesis, for it would require a specialist in children's literature even to begin to do justice to that task. The most of the books were, naturally, stories, but a very considerable amount of non-story reading was done. We have listed 111 non-story books for the Special class and 49 for the Control,—13.9 per cent of the total number listed for the former, and 9.2 per cent for the latter. This group of books was classified under 7 headings, and the results by averages per child, are shown in Table XLI. Among the story books there were many which contained a large amount of informational material,

¹ Theoretically, the number of preferences in each group should be twice as large as the number of children; but some of the Control children do not read any magazines regularly, and some read only one.

travel, for instance; but books of that type were not included in this classification.

TABLE XLI
NON-STORY BOOKS READ—AVERAGE PER CHILD

	Special			Control		
	Boy	Girl	Total	Boy	Girl	Total
Biography.....	.78	0	.47	.29	.13	.17
Handicraft.....	.46	0	.27	0	0	0
Drama.....	1.56	1.50	1.53	0	.06	.04
History and Myth.....	3.33	.33	2.20	1.86	.94	1.20
Poetry.....	1.11	1.00	1.07	.43	.50	.48
Science.....	2.33	.50	1.60	.14	.13	.13
Travel.....	.33	.17	.27	.29	0	.09
Total.....	10.00	3.5	7.4	3.00	1.70	2.10

The data of Table XLI show that on the average the Special group read three and one-half times as many non-story books as the Control. The Special boys made by far the best showing in this field. The comparatively large amount of drama listed by the Special class consists of plays the teacher read aloud. Most of the poetry listed is of a type that children of this age would be expected to enjoy. The "history" books in the case of the Control class are about half books of myth and legends. It is in books of history and science that the Special group make their high records; this is quite in accord with the results of magazine reading.

In reading over the total list of books, the reader's attention is at once caught by the number of series of books listed. Many of the present-day children's books are published in such series; a few of these have real value as children's books, but many are of inferior quality. A study of the lists reveals the fact that 20 per cent of the total reading of the Special class and 18.5 per cent of that of the Control consists of books in series. The difference in quality of these books which seems of most importance is the following: the Control children list seventeen of the Bobbsey Twins series, to one listed by the Special. These books are often read and enjoyed by children of seven and eight years of age; they represent a very childish type of reading. Other differences which on the surface seem significant are probably due to differences in the number of boys and girls in each group.

The two groups were compared as to number of "classics" for children listed. We included here such books as *Little Women*,

Alice in Wonderland, *Treasure Island* and *Tom Sawyer*. If we eliminate the books which we know were read aloud to one or both groups, we find that the Special group listed about five such books per child, and the Control about four per child. In terms of percentage of the total number read, 10 per cent of the Special books and 17 per cent of the Control fall in this class. It may be that the Control children read such "classics" in place of the non-story books read by the Special class.

Only a small number of books for grown people are read by the children. Such books for the Special class include Davis' *Elementary Physical Geography*, *Evangeline*, *Iliad*, *Kenilworth*, *Last Days of Pompeii*, *Oliver Twist*, *Penelope Intrudes*, *Puddin' Head Wilson*, and the works of George Eliot. A similar list for the Control group contains only *A Tale of Two Cities*, and E. S. White's *The Riverman*.

In listing the books most frequently mentioned we found that all those which came at the top of the list for the Special had been read aloud in school. Of these, the ones which had been read most recently were *not* as a rule, the ones which were most frequently listed. But the high Special frequency for *Just David* may be due to recency. One of the most interesting points is that *The Victor of Salamis*, a novel of ancient Greece, should be mentioned more often than such a book as *Tom Sawyer*. In the most frequently mentioned books there seems to be no advantage in favor of either group. The foregoing paragraphs seem to indicate that, while the quality of the books read by the Special children is somewhat better than those read by the Control, they *should* have read books of still better quality. The type of books read may be due to the parents' choice of books; to the lack of school library adequately stocked with good children's books; to lack of guidance in choosing books from the public library. It is unquestionably true that gifted children read many poor books because interesting, well-written books are not called to their attention.

10. (b) *Authors*. The Special class list one author for every 3.2 books they name; the Control mention one for every 5.8 books. Children of superior intelligence undoubtedly pay more attention to the author of the books they read than do average children. Difference in memory may also be a factor.

The combination of Alger and Shakespeare in the Special list of

authors frequently mentioned is further evidence of our suggestion that the reading of these children would have profited by more guidance. These lists for the two groups have one author in common, Louisa Alcott. The contrast between the lists for the two groups is very marked, for the authors mentioned by the Special class undoubtedly require a greater maturity of understanding than those listed by the Control. Alger, the least desirable author in the Special list, is balanced by Laura Lee Hope in the Control list.

10. (c) *Preferred Books*. In considering the children's preferences in reading, no distinction was made as to whether a book was given first, second, third, fourth or fifth choice. It is probable that all of the books in the five best liked are books which the children really enjoy a great deal, but it is unlikely that the ranking within this five is especially significant. The books for the girls and boys in each group were listed separately. The number of different books listed by each group, and the number listed only once by each, are as follows: Special, boys, 39, 36; girls, 22, 16; Control, boys, 31, 28; girls, 52, 44. Only four books are common to the lists of the Special boys and girls, and these were all books that had been read aloud. Only three books were common to the Control boys and girls, and two of these had been read aloud. The Special and Control boys have seven books in common: *Arabian Nights*, *Tarzan of the Apes*, *The Beasts of Tarzan*, *Call of the Wild*, *Huckleberry Finn*, *Tom Sawyer*, *Just David*. The Special and Control girls have four books in common: *Jack and Jill*, *Just David*, *Little Women* and *Pollyanna*. These facts show a wide range of interest, and a marked difference in the boys' and girls' preferences.

In order to make a more careful comparison of the preferred books, they were classified under nine headings, and the results are given in Table XLII.

The Special boys are markedly higher in instructive books, and somewhat higher in literary books and books in series; the Control boys are slightly higher in adventure and children's books. The Special girls show greater liking for adventure and sentimental tales than the Control girls, while the latter list more books in series and more books about children. In literary value of the books preferred the two groups are practically equal. On the whole it is probable that the best liked books of the Control boys

represent the poorest selection, and those of the Special boys the best. The lists for the two groups of girls seem to the author about equal in merit.

TABLE XLII
TYPES OF PREFERRED BOOKS*

	Total Number				Average per Child			
	Special		Control		Special		Control	
	Nine Boys	Six Girls	Seven Boys	Fifteen Girls	Boys	Girls	Boys	Girls
1. Adventure.....	18	5	18	0	2.0	.83	2.57	0
2. Animal.....	6	0	2	3	.67	0	.22	.20
3. Detective.....	0	1	2	0	0	.17	.22	0
4. Fairy Tales.....	2	2	3	2	.22	.33	.33	.13
5. Instructive.....	13	2	1	4	1.46	.33	.11	.27
6. Literary.....	10	9	8	23	1.11	1.50	.89	1.53
7. Sentimental.....	5	10	4	15	.56	1.67	.44	1.00
8. Series.....	6	0	2	16	.67	0	.22	1.07
9. About Children....	5	12	7	46	.56	2.00	.78	3.07

*Samples from the children's list of each of these classes are as follows: 1. *Tarzan of the Apes*. 2. *Wild Animals I Have Known*. 3. *Sherlock Holmes*. 4. *Puss in Boots*. 5. *Everyday Life in the Colonies*. 6. *Being a Boy*. 7. *Michael O'Halloran*. 8. *Five Little Peppers*. 9. *Hans Brinker*. Books were often classified under two headings; for instance, *Treasure Island*, as adventure and literary; *Five Little Peppers*, as series and about children.

10. (d) *Summary of Books and Authors*. The foregoing discussion of books and authors may be summarized as follows: the Special children, on the average, listed twice as many books as the Control; they read three times as much non-story material; they named four times as many authors. The book lists for the two groups do not overlap much. The Control listed a larger percentage of children's classics, but they averaged only four such books per child, while the Special averaged five per child. The best liked books are extremely varied in quality.

Summary of the Data on Interests, etc., for the Special and Control Groups. Summarizing the comparison of the Special and Control groups in the preceding pages and considering especially the total number listed in any field, we find that the two groups are very similar in listing flowers, games, plays and moving-picture actors. The Special is slightly inferior to the Control in listing fabrics; it is somewhat superior in tools and magazines. But in birds the Special list more than twice as many; the same is true for books; and they list four times as many authors. It seems clear that while the Special children have read more, they have not done this

at the expense of interest in and experience with such concrete objects as tools, birds and flowers.

TABLE XLIII

NUMBER OF OBJECTS, ETC., LISTED BY EACH CHILD—SPECIAL GROUP

	Tools	Fabrics	Birds	Flow- ers	Games	Plays seen	Movie Actors	Maga- zines	Series incl.	Books* Series not incl.
1.....	42	3	51	43	19	0	14	14	83	64
2.....	35	17	33	40	31	10	9	8	123	79
3.....	35	11	24	18	27	1	8	2	35	35
5.....	40	6	42	17	28	2	13	10	121	67
7.....	23	3	24	20	21	1	15	1	..	..
8.....	21	2	16	18	22	0	14	4	..	..
9.....	19	23	15	..	32	9	21	2	48	46
11.....	39	16	32	22	16	3	37	8	79	40
12.....	26	9	23	25	28	2	10	2	77	41
13.....	22	10	20	36	26	2	15	1	56	49
15.....	..	..	35	43	34	4	40	5	53	53
16.....	17	15	32	35	31	11	38	5	48	47
17.....	22	4	27	15	26	0	36	4	82	82
18.....	..	..	29	31	33	3	..	4	43	43
19.....	28	26	19	34	33	7	20	4	..	..
20.....	26	13	16	25	29	4	23	5	99	66
22.....	33	14	31	26	18	0	55	7	86	55
23.....	18	12	26	..	..	2	14	8	147	43
Av.....	27.9	11.5	27.5	28.0	26.7	3.4	22.5	5.2	78.7	54.0
Med.....	26.5	12.0	27.0	26.1	28.3	2.75	15.75	5.0	79.5	49.5
Range.....	17-42	2-17	15-51	14-43	21-34	0-11	8-55	1-14	35-147	35-82
S.D.....	8.06	6.8	9.17	9.2	5.49	..	13.2	3.33	32.1	15.5
σ av.....	2.01	1.7	2.16	2.3	1.33	..	3.20	.79	8.03	4.0

DIFFERENCE BETWEEN AVERAGES OF SPECIAL AND CONTROL GROUPS

Diff.	10.3	-4.1	15.7	-0.7	4.2	..	.45	2.1	49.8	30.6
σ diff.....	2.63	2.39	2.67	3.02	2.13	..	3.95	1.02	8.63	4.57

* In the column headed "Books" two sets of figures are given: the difference in the two columns depends on how we treat the data on books in series. For instance, child No. 1 lists the names of 64 books, but he also says that he has read 5 books in Series A, 7 books in Series B, etc. If we add the books in series he says he has read, but does not list individually, his total of books becomes 83. A similar pair of numbers was listed for each child. The difference between the average for the two sets of figures is much greater for the Special than for the Control group. The data of the "series not included" column corresponds to the data on "Books" in Table XXXVII. If we are chiefly interested in the number of books read by a certain child, the data of the "series included" column should probably be used. If we compare the two classes with respect to average number read, "series included," the Special reads 2.7 times as much as the Control. This is probably a truer statement than the 2.3 of Table XXXVII, but it would have been impossible to make all our comparisons in the field of books on the data of the "series included" column, because we do not know in detail just what it is we are "including."

It is obvious that we have been measuring not only amount of experiences, but also interest in these experiences, degree of memory for them, flexibility of association, etc. As suggested in connection with the books read, the Special children may have better memories than the Control, and this may account for some of the differences found. But the complex of elements suggested above

is one that is of importance in practical adjustments, and the results should throw light on the differences between the two groups. This method of listing objects should probably have been supplemented by a comprehensive range of information test, such as Test 8 of Army Alpha.

TABLE XLIV
NUMBER OF OBJECTS, ETC., LISTED BY EACH CHILD—CONTROL GROUP

	Tools	Fabrics	Birds	Flow- ers	Games	Plays Seen	Movie Actors	Maga- zines	Books* Series incl.	Series not incl.
1-C.....	..	..	..	..	..	..	..	..	13	13
3.....	..	..	..	..	..	..	..	..	15	15
4.....	10	14	7	23	16	0	9	0	14	14
5.....	22	27	21	41	18	1	9	9	51	38
7.....	..	..	..	..	..	..	..	..	10	10
8.....	10	22	..	34	..	4	42	..	39	34
11.....	10	9	8	24	27	0	30	0	16	16
13.....	11	15	5	22	37	1	27	0	17	17
18.....	36	25	20	38	25	14	18	4	55	52
29.....	29	2	21	18	25	0	30	0	29	29
32.....	..	..	..	..	..	..	..	..	59	21
33.....	24	19	20	31	23	0	14	4	28	27
35.....	19	19	10	24	20	1	28	3	47	33
4-M.....	13	21	..	45	28	4	16	..	38	38
5.....	7	12	4	20	12	0	32	3	10	10
7.....	19	19	13	16	..	7	10	3	13	13
9.....	21	4	5	..	25	0	35	1	25	18
10.....	18	8	19	26	21	4	6	8	53	28
11.....	25	5	12	22	20	..	32	5	31	31
14.....	18	21	13	39	24	..	19	5	27	23
15.....	23	23	11	38	35	0	30	4	39	26
16.....	17	13	..	..	..	11	21	..	..	..
19.....	4	13	5	29	14	2	10	4	19	16
20.....	16	20	7	26	12	5	23	0	31	31
Av.....	17.6	15.6	11.8	28.7	22.5	3.0	22.55	3.1	28.9	23.4
Med.....	18.5	17.5	11.5	26.5	23.5	1.67	22.0	3.8	28.5	26.5
Range.....	4-36	2-27	4-21	16-45	12-37	0-14	6-42	0-9	10-59	10-52
S.D.....	7.6	7.0	6.2	8.3	6.9	....	10.08	2.7	15.23	10.56
σ av.....	1.7	1.67	1.5	1.95	1.67	....	2.26	6.5	3.17	2.2

* See footnote to Table XLIII.

We have thus far said practically nothing about the individual variation in these lists, nor have we given any data as to the reliability of the measures presented. In order to furnish data on these points we present in Tables XLIII and XLIV the score for each child in each list, the average, the sigma of the average, the difference between the averages for the Special and Control groups, and the reliability, in sigma, of that difference. The reliabilities in the fields of fabrics and flowers are so low that the difference is

not significant. In games and magazines the difference is more reliable, but it is not as high as it should be in order to make us absolutely certain that the difference found is a "real" difference. In the fields of tools, birds and books, the difference in group averages is thoroughly reliable. These measures of reliability may be compared with the conclusions as to group differences mentioned on page 154.

Ambitions of the Special Class Children. On April 7, 1919, as part of Series 1 of the Compositions, the Special class children wrote on the topic, "What I would like to do when I grow up." The exact directions given to the class were as follows:

Use your 20-minute period to write a composition about what kind of work you want to do when you grow up. Tell what you want to do; something about the work so that I will know what it is like; and *why* you want to go into that particular line of work. Make it as interesting as you can.

The resulting papers written by the class may be summarized as follows:

No. 1. Boy, I.Q. 143. Study zoology, because father is a zoologist, and animals are "so interesting."

No. 2. Boy, I.Q. 146. A banker, because "I hope I will earn much money and make friends."

No. 3. Boy, I.Q. 128. An electrical engineer. "So many useful inventions are made from electrical engineering."

No. 4. Girl, I.Q. 159. Teach school. "I think I am better fitted for that work." Also music. "I like to hear the notes blend together in beautiful melodies."

No. 5. Boy, I.Q. 129. Electrical engineering, because "I always like to monkey around where there is any wiring or any other electric work being done."

No. 7. Boy, I.Q. 120. A bookkeeper, because "there is a lot of arithmetic in it."

No. 8. Boy, I.Q. 134. A mechanic. "Many plants depend mostly on their chief mechanic; a chief mechanic is always well up in study."

No. 9. Girl, I.Q. 114. Bookkeeping and stenography. "I want a real hard job, so it will keep me busy."

No. 10. Boy, I.Q. 127. A bookkeeper, "because I like to work arithmetic and things," or an author and "write stories like those of Joel Chandler Harris."

No. 11. Boy, I.Q. 120. Biology, especially the study of "butterflies and moths of which there is not much known."

No. 12. Boy, I.Q. 162. In the oil business "because there is a lot of money in it and because I like the work and I have a lot of relatives in that business."

No. 13. Girl, I.Q. 139. A school teacher. There are "so many things to learn."

No. 14. Girl, I.Q., 124. An entertainer that "travels around places and gives lectures." Also a writer of stories and poems.

No. 15. Girl, I.Q. 142. A story-writer. Plays for picture shows. "I could sit down and write and write and write. . . . I want to be able to write a large book, not for children, but for older people."

No. 16. Girl, I.Q. 122. A nurse, "if there is a war going on, and I will nurse the sick or wounded soldiers."

No. 17. Boy, I.Q. 130. An electrician. "He goes out and fixes telephone wires, and puts in switch-boards, etc."

In some cases the foregoing represented the children's real ambitions; in others they probably did not. A fairer statement would doubtless have been obtained if the assignment had not been so complicated. It seems probable that one or two of the children put down the thing that they thought it would be easiest to write about. From conversation with the class, it was quite clear that most of them had thought definitely about what they wanted to do when grown up. The author is reasonably sure that the ambitions stated were at that time the real and previously considered desires of the following children: 1, 2, 3, 4, 5, 13, 14, 15, 16. Concerning the others she feels less certain. No. 12 certainly had some aspirations toward engineering, and the other boys occasionally teased him by saying, "P. wants to build a bridge across the Atlantic."

In a few cases the "ambition" is definitely below what the child's ability should make him capable of doing; this is particularly true of No. 8 and No. 17. In only two cases does the author think the child may lack the ability needed for the "ambition" given: No. 11's wish to become a biologist, and No. 10's desire to write stories. A more detailed statement of the relation of ability to "ambition" will be given in Chapter VIII in connection with individual studies of the children.

The general tendency of the Special class ambitions is toward the following fields: biology, bookkeeping, various forms of engineering, teaching and writing. With the possible exception of bookkeeping, these are all occupations which require a high type of mentality. Undoubtedly all the children in the group are in need of some educational and vocational guidance in order that they may find the line of work in which they will be happiest and most successful.

Unfortunately we failed to get statements of these children's ambitions in June 1920; nor have we any statements at all concerning the ambitions of the Control children.

Qualities a Good Teacher Should Have. Some further data which perhaps have an indirect bearing on the Special children's interests have to do with the statements they wrote on May 20, 1919, in answer to the question, "What qualities do you think a good teacher should have?" The qualities listed were as follows, each quality appearing only once unless otherwise indicated: By the boys, not cross, 2; reads good stories, 2; explains things well; has ability to teach; thinks quickly; kind; full of fun; ability to manage children; takes us on bird hunts. By the girls, explains things well, 4; sweet-tempered, 4; kind, 3; "smiley"; knows what children need; has knowledge; is bright (i.e., intelligent); sensible; good; patient. Ability to explain things well, a sense of humor and absence of "crankyness" seem to be the qualities most appreciated. There is no doubt that these lists were much conditioned by the characteristics of the Special class teacher. One boy, instead of listing any qualities of a good teacher, wrote, "Miss C. has all of them," and some such state of mind probably influenced all of the lists. It is nevertheless interesting to know just what qualities bright children of this age are likely to put into words.

CHAPTER VIII

THE ABILITIES OF THE INDIVIDUAL CHILDREN OF THE SPECIAL CLASS

IN the preceding chapters we have given comparatively little attention to the individual children who composed the Special class. The most significant part of the class work was its emphasis on *individuals*; the group was worth while as it represented individual progress, and not as a study of averages and medians. Lack of space makes impossible a detailed description of each child, but we shall try to give as clear a picture as possible of several boys and girls. Most of the children who were chosen to be thus described were those who presented special problems which membership in the class helped solve. Some of the most delightful and interesting children are not described.¹

We have shown that in June 1920 the group as a whole were, in the educational tests, up to the norms for the end of Grade 7. It is important to know whether this is true of all the individuals of the group. Were there perhaps several who fell below this standard, and therefore could not be expected to do successful work in Grade 8? By the method of conversion explained in Chapter III the scores of each child in the tests of June 1920 were changed into year-month achievements. The results are shown in Table XLV.

Of the 212 achievements presented, 31.6 per cent are below 7-0. Half of these are concentrated in the 70 scores in Woody Arithmetic, in which the class scores unusually low. 48.6 per cent of these scores are below 7-0. For all the other tests 23.2 per cent

¹ Our records of physical measurements of the children, are unfortunately few. In Table LIV of the Appendix, the height and weight of 19 children on November 21, 1919, is given. When each child's weight is compared with the norm for his age and height (norms taken from *Health and Education*, by T. D. Wood), we find six of the nineteen more or less underweight. Two, one boy and one girl, are more than 10 per cent underweight. Four boys and one girl are more than 10 per cent overweight. The median tendency of the class is 2.7 per cent overweight. Only 3 of the 19 children are less than the average height for their age. The health of the class as a whole was good. The health of children 1, 3, 15, 17 and 19 was probably not better than the average of school children. Most of the others were in excellent health.

TABLE XLV

TESTS OF JUNE 1920. CONVERTED INTO GRADE-MONTH ACHIEVEMENT. INDIVIDUAL PUPILS OF SPECIAL CLASS.* VARIABILITY FROM TEST TO TEST

	Add.	Sub.	Mult.	Div.	Stone Reas.	Vocab- ulary	Read- ing	Spell- ing	Comple- tion	Compo- sition	Geog- raphy	History	Median Achieve- ment	Average Achieve- ment	Deviations (in Months) from Class Medians		A.D. from Average of Deviations	Combined Rank in 12 Tests
															Av. of	Med. of		
1.....	6-2	8-5	7-0	8-4	...	9-0	9-9	9-1	12-1	9-2	9-9	8-5	9-0	8-9	10.1	13.2	9.7	1
2.....	6-6	7-7	7-8	8-4	9-7	9-0	...	7-6	7-6	9-7	8-6	7-4	7-8	8-2	3.1	4.5	7.5	3
3.....	5-4	8-5	7-3	7-5	9-0	9-0	9-0	8-1	9-1	7-2	6-6	8-5	8-3	7-9	3	.15	9.2	8
5.....	7-8	6-5	7-3	7-0	10-2	9-0	6-3	4-5	8-2	9-5	9-6	8-8	8-0	7-9	.5	.25	10.2	8
6.....	4-4	6-5	5-5	5-6	5-8	...	...	5-2	9-1	...	4-9	6-5	5-6	5-9	-16.7	-15.7	7.0	19
7.....	8-8	7-7	7-3	...	8-0	7-3	7-3	4-5	8-0	7-7	5-7	7-0	7-4	7-2	7.0	-12.5	13.3	16
8.....	5-4	6-8	6-4	7-0	5-1	4-6	8-2	7-6	9-5	8-6	9-7	8-7	7-3	7-3	-5.4	-2.5	9.4	13
9.....	7-8	7-2	7-0	7-0	8-8	7-1	6-6	6-1	4-2	8-6	8-1	8-3	7-1.5	7-2	-6.1	-2.0	10.75	14.5
11.....	6-2	4-9	6-0	5-0	6-4	9-0	7-0	6-9	9-5	8-4	8-1	...	6-9	7-0	7.4	-5.5	6.0	17
12.....	6-6	7-2	6-0	7-5	6-4	8-8	6-9	7-3	8-3	8-2	8-2	9-9	7-4	7-6	-2.3	-1.5	5.0	10
13.....	6-6	7-7	7-8	7-5	6-6	9-0	9-9	7-3	11-9	9-2	8-2	8-5	8-3	8-3	5.1	0	7.4	4
15.....	8-3	8-1	5-3	8-9	4-4	...	8-6	6-9	9-0	10-1	5-7	9-1	8-3	7-7	-8	5.5	13.5	8
16.....	3-6	5-8	4-8	5-3	6-6	...	7-3	9-1	8-0	10-0	5-2	7-1	6-6	6-6	-11.2	-14.5	11.4	18
17.....	8-3	...	7-0	6-0	6-6	8-8	6-9	7-6	5-8	8-9	6-3	7-8	7-6	7-5	-4.1	-3.5	10.3	12
18.....	...	...	...	4-9	8-0	9-0	6-9	7-3	9-5	...	6-1	7-1	7-2	7-3.5	-6.6	-3.5	9.5	14.5
19.....	4-1	6-1	5-5	5-6	5-8	9-0	10-0	9-1	13-3	10-1	9-6	8-5	8-7.5	8-1	2.2	.5	16.0	6
20.....	7-8	8-1	7-6	9-4	8-6	4-8	10-0	8-1	9-7	10-0	7-9	8-6	8-4	8-4	5.4	7.5	10.4	2
22.....	...	5-1	7-0	8-0	6-4	9-0	7-3	...	10-7	9-7	8-9	9-0	8-4.5	8-1	1.0	4.5	7.0	5
23.....	5-9	6-1	5-6	6-5	7-7	8-8	7-3	6-0	9-4	7-9	9-5	9-1	7-4.5	7-6	-3.6	-2.5	7.2	11
Median.....	6-6	7-2	7-0	7-1	7-1.5	9-0	7-4	7-4	9-2	9-2	8-2	8-5.5	7-6	7-6	...	...	...	...
Average.....	6-4.6	7-0	6-5.7	6-9.7	7-3.6	8-2	7-9.5	7-1.3	9-1	9-0	7-7.3	8-2.4	7-6.6	7-6	...	...	...	...

*The Thorndike Vocabulary and Reading Scores are very inaccurate in some cases because of the difficulty of calculating individual scores which are comparable to the Thorndike method of computing class scores. The composition scores used were the combined scores for April 13 and 23, of Series 3. In geography, the scores from Sets N and O were converted into year-month achievement, and the two results for each child averaged. The same was done with Thought Scale A and Character Judgment Scale L to obtain the data in the history column. With the exception of the Trabue-Kelly Completion, and compositions, the norms available do not go beyond Grade 8. It was therefore necessary to infer the intervals beyond Grade 8, and the results are probably inaccurate. It is likely that this inaccuracy has lowered, rather than raised, the children's scores, since the tendency was probably to make the inferred interval too large.

are below that standard. The important point to note is whether these low scores are all concentrated in a few individuals. The poorest record has 8 scores below 7-0, the best record has one. The median and average achievement for all tests of each child are shown in Table XLV. We find three children whose median achievement is below 7-0, but only one of these, No. 6, is more than a half-year retarded. The range of achievement within the group covers 3.4 grades. Similar data for the average achievements may be seen in Table XLV.

A careful study of the achievements for different tests should give some indication of the fields in which a child will do good work and the ones in which he will do poor work. But this is complicated by the fact that the work of the class as a whole varies so much from test to test. It is unlikely that the children's innate abilities in arithmetic are as far below their abilities in composition as the data in Table XLV would indicate. Differences in previous training, in present instruction, in text-books, in accuracy of norms, etc., must all be taken into consideration in the explanation of the differences between tests. In order to in part obviate this difficulty, each child's score in each test was converted into a deviation above or below the class median, and from these figures an achievement graph was drawn for each child. From this a summary could be made of the type of tests in which an individual did poor work, and of the type in which he did good work. These summaries will be discussed in connection with the accounts of each child.

The deviations from the class median may be averaged, or their medians may be found, and the results will show in another way the relative achievements of the individual children. These averages and medians are shown in Table XLV. The children in the class may be ranked, as to achievement, by these averages and medians of deviations, as well as by the averages and medians of the test scores. The four rankings are very similar for most of the children; in a few cases there is wide divergence. The four rankings were combined, and a ranking based on this combination is shown in the last column of Table XLV. This is probably the best single ranking we have, by the results of the educational tests. The Average Deviation from the average of deviations for each child is also shown in Table XLV. This indicates the tendency of each child to keep the same level of achievement in all tests. Thus,

No. 19 varies most from subject to subject, while No. 12 varies least.

In the following accounts, the material will be drawn from the results of the tests, from the author's observations and from careful accounts of individuals written by the teacher of the class. It is unfortunate that we have no more objective measures of character traits, etc., than those here recorded. The statements made are a combination of the judgments of the teacher and the author. Wherever there was marked disagreement between these two judgments, this fact has been noted.

No. 1. (*M*—). Boy. On entering class, C.A. 8-9, M.A. 13-8. On completing grade 7, C.A. 10-3, M.A. 16-4. His three I.Q.'s are 156, 142 and 160. Father's occupation, professor of zoology in university. Mother's occupation, musician and author.

M's mother told us that he learned to read at four years of age. At eight years, he was doing superior work in Grade 4B. He was given an extra promotion from 4B to 5B, and from the latter class came into the Special group. He was enrolled in the class all of the first year, but was absent a great deal because of illness. Such absences did not seem to interfere with his going on with the class when he returned. When he was well enough he studied at home, even if he could not attend school. In the summer of 1919 his family moved to another part of the city, and in September he entered School G. But in November his mother asked if he might return to the Special class, for he was so unhappy in School G that he could not bear to stay there. Investigation gave us the facts that the teacher and principal in that school were prejudiced against him because he had come from a Special class. They said he was stupid, inattentive and impudent. His mother helped him to make up the French the class had had while he was in the other school, and he was soon doing work as good as he had done the previous year.

M is a quiet, meditative boy. He looks rather babyish because of his round face; he is often dirty and tousled. To a casual observer he does not *look* especially bright. He often *seems* inattentive. If a question is asked him, his thoughts seem to be coming back from a great distance, but when he finally "comes back," he almost never fails to give a correct and interesting answer to the question asked. The ability of such a child as M is easily overlooked, and we could understand that an unsympathetic teacher

might easily fail to perceive his high ability. M's father and mother are both highly intelligent people. His intellectual progress is doubtless greatly assisted by association with them. He is provided with many well-selected books and he reads a great deal.

In educational tests M holds highest place in the class. His two A.Q.'s are .99 and 1.12.¹ His median educational achievement is 9-0. He falls below the class median in only two tests, addition and history, four months and one month respectively. On the whole we may consider him as about average for the class in arithmetic, vocabulary and composition. (See page 112 for one of his compositions.) But in ability to read, and to understand and remember what he reads, he stands very, very high. The statements made concerning him on page 22 are, on the whole, substantiated by our subsequent experience with him. There is every reason to suppose that he will be successful if he follows his "ambition" of becoming a zoologist.

M would be a student under any circumstances, but he especially needed experience with other children who were intelligent enough to appreciate his own intellectual interests.

No. 2. (N—). Boy. On entering class, C.A. 8-6, M.A. 12-5. On completing Grade 7, C.A. 9-11, M.A. 14-2. His three I.Q.'s are 147, 146, 143. Father's occupation, consulting engineer. N's brother has an I.Q. of 144 and his sister one of 135. His mother's score in Army Alpha was 181, a very high achievement. It is evident that he comes from a family of high ability. He had very unusual advantages at home, in the way of books, pictures, music, etc.

N's mother had taught him at home and when he began school at five and one-half years of age, he entered 2A. He completed 4A a few days before he was eight years old. He was a member of the Special class throughout its history, and had an excellent attendance record, although his home was about a mile and a half away from the school. He was, throughout, the youngest child in the class.

N is a quiet, reticent, almost secretive boy. When he came to us he was fast losing interest in school, because the work he was given to do, and the companions he was thrown with, were so far

¹ For February 1919 and June 1920. See pp. 62-3 for a statement of how these Accomplishment Quotients were obtained. The 1920 A.Q. does not include the results of Arithmetical Reasoning and History.

removed from his real interests. He was *very* strictly brought up at home, and this probably had much to do with his tendency toward quiet withdrawal within himself. He was much given to nervous movements; for him to sit still for any length of time was probably real misery. He seems to the author the type of child, who, under unfavorable conditions, might develop dementia praecox, or some form of hysteria. He seemed to need two things that the Special class could give him,—companionship with children of interests similar to his own; and affection, appreciation, and a not too critical attitude from older people. The effect of these on the boy's attitude was markedly helpful. He became actively interested in school work, as well as more socially-minded. His mother said that the first year in the class had "saved" him, and she could not say enough in appreciation of what the class had done for him.

In educational tests N's combined ranking is three. As representing his school work, this rank seems to the author somewhat too high. His median educational achievement is 7-8. His June 1920 A.Q. is 1.05. He falls below the class median in two tests, completion and history. He ranks very high in arithmetical reasoning and reading. On the whole, he represents the type of high ability in mathematics and reasoning, with average ability in the language group. The high ability in "reasoning" was prophesied on page 22. He wishes to become a banker, and we see no reason why he should not succeed in this.

N's nervousness and reticence combine to make him the kind of boy who might be considered very annoying by the usual teacher. He was especially in need of the sympathetic individual attention of the Special class.

No. 3. (D—). Boy. On entering the class, C.A. 10-2. M.A. 13-5. On completing Grade 7, C.A. 11-8, M.A. 16-9. His three I.Q.'s are 132, 128, 144. Father's occupation, carpenter. D's mother told the author that neither she nor D's father had had any education beyond the eighth grade, and that they could not be of much help to their son in his work. When he had questions to ask, he went to their Lutheran minister.

The school history of D is of particular interest. He entered school at six years of age, and had not skipped any classes. When it was known among the teachers in the school that D had been selected for the bright class, there was much protest. They said

that he was inattentive and careless; and besides, he came from a stupid family! An older brother had apparently done very poor work, but a younger brother, when tested, made an I.Q. of 112. In spite of the teachers' protests and the doubts of the principal, D was put in the Special class, and the teacher tried to be very fair in judging him. For the first month he did seem very inattentive, but as he became adjusted to the atmosphere of the class, he began to do excellent work, and was soon showing the real ability he possessed. He was very fond of reading, especially of scientific magazines. The author has seen him clasp a copy of a scientific monthly in his arms, while he did an arithmetic problem. As soon as that was finished he turned devoted attention to the magazine; but returned at once to the arithmetic as soon as more work was assigned. He asked excellent questions, and it was he who wished to go to Niagara Falls to "improve the little car that goes over the falls."

The effect of the Special class work on D may be best expressed in the words of his teacher:

He reached and maintained a high place in school work and mental tests. He was one of the most active, interested boys in the class. He was both rapid and accurate; had a good memory, a wide range of interests; and was quick of comprehension. When asked why he did not do so well the year before, he said, "Oh, I don't know. It wasn't so much fun as it is now. I like the things we do here." . . . He did a great deal of collateral reading in history, geography, etc. . . . He has become definite instead of rather aimless, alert instead of inattentive.

D is a very sensitive boy; he is unusually lovable. He has a strong sense of fair-play, and is quick to go to the help of a smaller or weaker child. He has a fine appreciation of beauty; he responds quickly to kindness and appreciation. D had a paper route which kept him busy every night after school, and with the money he earned he bought most of his own clothing.

In educational tests, D ranks 8. His median educational achievement is 8-3. His two A.Q.'s are .94 and 1.03. He falls below the class medians in six tests, but in three of these for only one month. The others are addition, composition and geography. (See page 111 for a limerick written by D.) In the other tests of computation he is well above the class median, while in arithmetical reasoning he is 18 months above. He also makes a high score in reading. The educational picture presented by D is very much like that for N, except that in language ability he is probably

somewhat lower. This is perhaps due to lack of technique, for he seems to have more imaginative and appreciative ability than N. These results corroborate the statement of his abilities given on page 22. He wishes to become an electrical engineer, and, as far as we can judge, he should be able to succeed in this ambition.

D gained tremendously from his two years in the Special class. No small part of this consists in his realization that he *can do good work*. D is a clear illustration of the waste of ability which may go on if a bright child is left with average children.

No. 6. (B—). Girl. On entering the class, C.A. 9-7, M.A. 12-4. On completing Grade 7, C.A. 11-0, M.A. 16-2. Her three I.Q.'s are 128, 126 and 147. Father's occupation, attorney.

For the first two years of her school life, B attended a private school. She skipped the last part of the first and all of the second grade. She was a member of the Special class for four semesters, except for three months in the spring of 1920 when she went south with her mother. She missed so much class work during this period that it was doubtful whether she should be promoted with the class to 8B, but this promotion was finally given her.

B has a remarkable memory, and a large amount of her high age credits in the Binet were gained on memory tests. In two tests of logical memory, she received ranks of 1 and 2 in the class. She was less studious than most of the other children, and had a well-developed interest in pretty clothes and in casting sidelong glances at the boys. She could dance, sing, and play the piano and ukelele. Her mother was ill a great deal, and B had much responsibility in the running of the home.

In educational tests, B ranks lowest in the class by all methods of ranking. Her two A.Q.'s are .97 and .90. Her median grade achievement was 5-6, that is, she was 14 months below where she should have scored. She is below the class median in all tests. Since her low scores may have been due to her long absence from school in the early spring, we have computed her grade achievement for June 1919. In 11 tests, the range is from 4-3 in arithmetical reasoning, to 6-9 in composition. The median achievement is 5-6, which is practically the grade the group should have attained, that is, half through Grade 6. In the language-reading group she does much better than in the arithmetic-reasoning tests. In the June 1920 series of tests she was not present for three of the language-reading group. If she had been, higher scores on these

might have raised her median achievement. It seems clear that the low score in the June 1920 series of tests was in part due to her long absence from school. In the description of B on page 22 we said, "Vocabulary and language ability are poor. General comprehension *very good*." The results of her tests and class work do not substantiate these statements. We do not have any information concerning her ambitions.

B's friendliness and good manners were an attractive element in the class-room, but she probably profited less from presence in the class than did many of the other children. With regular attendance, she should have done much better work, but she would probably not have suffered especially if she had been left in the ordinary class-room. She illustrates the problem of whether children who gain high I.Q.'s because of very high achievement on a narrow type of test should be considered desirable subjects for a Special class.

No. 8. (L—). Boy. On entering class, C.A. 10-2, M.A. 12-3. On completing Grade 7, C.A. 11-7, M.A. 15-0. His three I.Q.'s are 121, 134 and 130. Father's occupation, grocer. The I.Q. of his nine year old brother was 102.

L entered school at six years of age and had spent one year in each grade. He was a member of the Special class for four semesters. His 4A teacher had considered him one of the five brightest children in the class.

L is a boy who reads a great deal, especially in the field of history. He has many, many ideas which he wishes to share with others, but when he entered the Special class he had so poor a vocabulary that he could not express his ideas effectively. A definite attempt was made by the teacher to increase his vocabulary, and during the following year and a half his ability to express himself increased remarkably. In two years his Binet vocabulary increased from Year X to Year XIV. L had ideas and suggestions on almost every topic that came up for discussion, and the interest of the class periods would have decreased greatly if L had withdrawn from the class. In the subsequent work in the eighth grade his name was mentioned more often than any other as among the children who were doing good work.

L takes a very serious attitude toward his work; he is eager to learn. He is much distressed if he fails to understand a statement or explanation made by the teacher. Part of the helpful influence

of the Special class environment was to give him poise and to decrease his nervousness.

In educational tests, L's median achievement was 7-3. His rank is 13, but his general class work gave the impression of being much better than this. His two A.Q.'s are .87 and .95. With four exceptions his tests were all near the class median. He fell considerably lower in the arithmetical group than in the reading-language group. On three tests he scored lower in June 1920 than in June 1919, in addition, four months lower; in arithmetical reasoning, seven months; in vocabulary, eighteen months.¹ Apparently some cause was operating in the later series to bring his scores below his real ability. We do not have any record of what this cause may have been, but it seems certain that the tests of June 1920 do not represent his real ability. He is ambitious to be a "chief mechanic," but we may be sure that he will finally enter some field of work which will use more of his fine ability.

L's work in the Special class gave him a better vocabulary, greater ability to express his ideas, and more self-confidence. It stimulated his intellectual interests, and introduced him to a wide field of knowledge that he might otherwise have missed. His future training should take account of his high ability and interest in history.

No. 10. (W—). Boy. On entering class, C.A. 10-9, M.A. 12-7. On completing Grade 6B, C.A. 11-3, M.A. 14-3. His two I.Q.'s are 117 and 127. Father's occupation, superintendent of large paper manufacturing company.

W began school at seven years, and skipped Grade 2A. He was a member of the Special class until June 1919, when he moved to another town. W's whole school life had been spent in N School, where he was known throughout the building as a remarkably intelligent, efficient and dependable boy. He was very business-like, serious and mature in manner. His maturity was probably due in part to the fact that he was older chronologically than most of the other children, but aside from this, he undoubtedly possessed a poise unusual in a boy of his age.

In ethical judgments and appreciation W ranked very, very high. He was unusually unselfish and considerate of the rights of others. He acted as a moral stimulus to the other children, and

¹ The very low vocabulary score was probably due to careless omission of an easy part of the test.

always called out the best and truest in them. He was a very fluent and interesting talker; sometimes he talked so much that the other children did not have a fair share of the time left to them. He did not write as well as he talked, and his spelling was atrocious.

W's second I.Q. of 127 is probably not too high; but it is very difficult to judge his intelligence, without confusing with it his high ethical maturity. His teacher who had also taught him in the first grade, considered him the "most wonderful child she had ever known." Her statements about him may be somewhat exaggerated, but are quoted here in part because they do give an idea of how he impressed older people.

W's fineness in the littlest things, his almost uncanny keenness of distinctions and of the fitness of things, his evaluation of ideals, make him a most remarkable child. . . . He can attend to intricate and diplomatic business with the utmost poise and fineness. . . . His sense of fairness and justice was almost infallible,—the whole class came to rely upon his decisions. . . . He was a constant reader. He read poetry, prose, tales of travel and adventure; accounts of discoveries and inventions, mechanical and scientific processes, etc.

On one occasion when the class had been discussing the fineness, high-mindedness and integrity of Lincoln, one of the children in the class said quite simply, "That sounds just like W." The other children all agreed, but W, himself, who was very modest, was greatly surprised at such praise.

In June 1919 W's median achievement in twelve educational tests was 6-2. This is seven months beyond the achievement of 5-5 which the class as a group should have attained at that time. W represents an interesting case of high ability in spoken language, but low achievement in written language. An attempt to find the cause of the latter would have been a useful study, but we have little light to throw on this question. W's ambition was to be a bookkeeper or an author. His ability would certainly be wasted as a bookkeeper, and he will have to do some hard work in the technique of writing, if he is to become an author.

No. 11. (H—). Boy. On entering class, C.A. 10-9. M.A. 12-1. On completing Grade 7, C.A. 12-1, M.A. 14-4. Father's occupation, owner of photography company.

H began school at five and one-half years of age, and had not skipped any grades up to the time he entered the Special class. He came from School K where he was considered a remarkably

bright boy. This estimate of his ability seemed to be based largely on the fact that he could sing well, talk fluently and draw cartoons. His I.Q. of 114 did not make him eligible for the Special class, but he became a member of it in the way described on page 20. Subsequent I.Q.'s of 119 and 120 placed him above the lower limit of 117 I.Q. He continued in the class for four semesters and was promoted to Grade 8 in June 1920.

H is a very attractive boy, with sparkling eyes and a brilliant smile. His manners are excellent, when he chooses to use them. He had been very badly spoiled by too much attention, both in school and out. To be thrown with other children who could do much better work in some studies than he could, and equally well in all others (with the possible exception of drawing), was one of the best things that could have happened to him. His unpleasant bravado, his exaggerated and careless statements, his tendency to "smart" speeches, were all lessened as he continued in the class. He was always more or less lazy, and tried to make up for neglected work by pleasant smiles and compliments. His sense of fair-play was not as well developed as that of most of the other children. His ability to reason was far below the class level, and he found arithmetic extremely difficult. On the other hand, H could be a thoroughly delightful boy. He talked remarkably well, and was very clever at illustrating his talks on the blackboard. He read widely and wrote very well. He had a remarkable vocabulary. He sang well, played the ukelele, and was taking lessons on the drum. He was good in dramatic work, and the art teacher said that he had more ability in art than any other child in the building. He was interested in chemistry, electricity and photography.

H is an excellent illustration of the sort of child many people have in mind when one talks of bright children. He has great ability in the artistic and expressive fields, but he is very much in need of *wise* guidance and restraint. Unfortunately, certain improvements in his attitude which were made while in the Special class seem to have been lost in part during his work in the eighth grade. His air of "smart" bravado has returned, and his teachers report him as lazy, careless and a "bluffer."

In fairness to H, we give the following statement of the Special class teacher who was less drastic in her judgments of H than the author was. "H is one of the most natural unself-conscious children in the world,—that is really the secret of his wonderful charm.

He is absolutely sweet and childlike; he acts upon his impulses naturally and without restraint. He is a laughing, fun-loving boy, and enjoys life to the uttermost."

In educational tests, H's median achievement is 6-9. His rank in the class is 17. His two A.Q.'s are .98 and .95. He falls below the class median in all but two tests, vocabulary and completion. His variability from test to test is surprisingly small, but there is a definite tendency toward lower scores in the arithmetic group, and higher scores in the reading-language group. His completion of the "Lady or the Tiger" has been given on page 113, and a report of a talk on dyeing on page 118. The "prophecy" concerning him on page 23 has been fully corroborated by our experience with him. His "ambition" in 1919 was to become a biologist but he will probably find some other field of work in which his artistic abilities will be more fully used.

H needs to realize that his abilities should be used for the service of others, and not merely for his own advancement and pleasure. The author is in doubt as to how much of this realization was gained during his membership in the Special class.

No. 12. (P—). Boy. On entering class, C.A. 9-6, M.A. 14-6. On completing Grade 7, C.A. 10-11, M.A. 17-1. His three I.Q.'s are 152, 162 and 164. Father's occupation, traveling salesman.

P began school at five and one-half years of age and had not skipped any grades. He was in the Special class four semesters. In the last two series of Binet tests he made the highest I.Q. in the class. He has a most remarkable memory; when he was eight years, nine months old, he passed the Year XVIII memory tests in the Binet. But his ability is very general. In June 1920, when he was ten years, nine months old, he passed all but four tests in the whole Binet series.

P is very modest, quiet, and even shy. One would have to know him well and observe him carefully in order to realize his high ability. He is a very thorough and diligent worker, one of the type who would do remarkable work in research. He is not quick or showy in his work, but he has unusual powers of comprehension. His scores in educational tests were often low because he did not work as rapidly as the others. His work was remarkably even; his variability in the mental tests was the lowest in the class. Added to his carefulness and exactness is originality of thought and considerable ability in talking. His teacher writes of him:

With this maturity of intellect, P is not at all "old"; indeed his joy in childish pleasures is very delightful. He is loved for his modesty and fine manners, is much looked up to for his "wisdom." The boys say, "P is wise!"

In educational tests, P's median achievement is 7-4. He ranks tenth in the class in these tests. His two A.Q.'s are .76 and .83. His scores are below the class median in all but four cases, but none fall more than one year below. The statements about P on page 23 are probably correct, with the possible exception of his language ability being lower than his other abilities. That statement is true of his written, but not of his spoken, language. (But see page 111 for a limerick he wrote.) P's "ambition" to go into the oil business, and also his engineering interests, have been mentioned on page 158. Some form of engineering research is probably in accord with his ability.

P seems to have most needed association with people who would recognize his high ability, and encourage him in developing it. This he undoubtedly found in the Special class, and he has gained poise and self-confidence therefrom.

No. 15. (O—). Girl. On entering class, C.A. 9-10, M.A. 12-1. On completing Grade 7, C.A. 11-5, M.A. 16-1. Her three I.Q.'s are 122, 142 and 141. Her first I.Q. may have been too low because of incomplete giving of the test. (See Chapter IV.) O began school at six years of age, and skipped 2B. She was a member of the Special class for four semesters. She was not a very strong child and had had to miss many days of school.

O lived with her aunt and uncle who gave her all possible educational and cultural advantages. She had lessons on the piano, which she "just loved"; on the other hand, she "just hated" geography. She has very definite opinions, very decided likes and dislikes. She is a careful and earnest worker, but is rather easily discouraged. Her teacher describes her as follows:

O does fine housework, fine sewing and embroidery; she plays the piano, takes dancing lessons, and is really quite a versatile child. Before she was six she could make doll-dresses, crochet, embroider, knit and make tatting. She is energetic, resourceful, active and restless when not in action.

In educational tests, O's median achievement is 8-3. Her combined ranking is 8. Her two A.Q.'s are .83 and .96. Her record is one of the most variable in the class. She found science difficult, but in the eighth grade the French teacher considered her one of the best French pupils in the group. These results, in the main,

corroborate the statements made about her on page 23. She wishes to become a story-writer, and with proper training and experience she should be able to do something in this direction. When completing Grade 7, her composition achievement was 10-1. In both Series 1 and 3 of the compositions she held second place in the class.

O needs to develop poise, perseverance and self-confidence. Her work in the Special class has probably just begun her training along these lines.

No. 18. (U—). Girl. On entering class, C.A. 9-8, M.A. 11-7. On completing Grade 7, C.A. 11-1, M.A. 15-8. Her three I.Q.'s are 120, 129 and 141. Father's occupation, automobile salesman.

Unfortunately we have no record of U's progress in school, but the fact that she had almost completed 4B at 9-0 years of age would indicate that she must have begun school before six years, or else have skipped half a grade. She was a member of the Special class four semesters.

When U entered the class she was very nervous and excitable. Her attention wandered a great deal. She exclaimed "Oh goodness! I can't do that!" when any difficulty presented itself. Her two years in the Special class did much to give her poise and self-control. She began to do some good, steady thinking, and her class work improved accordingly. This increase in control probably explains in large measure the rise in her I.Q. U is a good illustration of the "artistic temperament" in a child.

In educational tests U's median achievement was 7-2. Her combined ranking is 14.5. Her two A.Q.'s are .96 and .99. She was absent at the time the special compositions used in this study were written, but others place her ability in composition at about 9-6, which is four months above the class median. The statements about U on page 23 are not substantiated by subsequent study of her abilities.

U has high ability; she has varied interests. But her success will probably depend upon the direction into which her unstable temperament is directed. Her semesters in the Special class undoubtedly did much to give her greater self-control.

No. 23. (V—). Boy. On entering class, C.A. 10-6, M.A. 14-11. On completing Grade 7, C.A. 11-2, M.A. 15-11. His two I.Q.'s are 142 and 143. Mother's occupation, public school teacher.

V began school at six years and had skipped 3A. He entered

the Special class in September 1919, and continued in it for two semesters. V is a small, but very lively boy. He "wiggled" most of the time, and his nervous movements made him the despair of his teacher, and the class-mates who sat near him. He had read very widely, and could talk fluently about many interesting things. The difficulty was to keep him from talking all the time. He was a sweet-natured boy and had no intention of disturbing any one by his temperamental "effervescence." Nevertheless, those who worked with him found him a veritable "Jack-in-the-box," who never stayed under the lid!

In thirteen educational tests V's median achievement was 7-4.5. His test rank is 11. He falls below the class median in eight tests, but in some of them he is very close to the median.

The main problem in connection with V was his nervousness and excitability; and a longer period of observation and training than ten school months was needed in order to make more than a beginning on this problem.

We have discussed in more or less detail eleven of the children of the Special class. We have indicated some of the problems they presented. We have tried to give some idea of the progress each made. It will probably be evident to the reader that this progress was due not only to the high abilities of the children, and to the fact that they were grouped in a small class, but also to the ability and interest of their teacher. The latter is particularly true with respect to progress in social and moral traits.

In connection with each child described we have indicated how well our total experience with him corroborated the summary and prophecy with respect to his abilities, which we gave on pages 22 and 23. These facts and similar ones about the children not here described may be summarized as follows: In the case of four children, Nos. 6, 16, 17 and 18, the "prophecies" fell far short of our later analyses of their real abilities; educational guidance for these children would have gone far astray if based on these prophecies. In the case of three children, Nos. 8, 10 and 12, the summaries on page 23 are about half correct. For the ten remaining children, these summaries and prophecies were remarkably corroborated by our subsequent experience with them. These facts will serve as a suggestion of the extent to which the Stanford Revision of the Binet Scale may be used as a diagnosis of special, as well as of general, ability.

SOCIAL CHARACTERISTICS OF THE CLASS AS A WHOLE

In this chapter we have thus far been concerned with the social and intellectual traits of individuals. We will add a short statement of the social characteristics of the class as a working group. Although the children were of extremely varied interests and temperaments they worked together as a group remarkably well. There was much good-natured give-and-take among them; they had very good times together. Each child was felt by the others as a very definite personality, with his own place in the class. The older members of the group took a pleasantly protective attitude toward the younger and smaller children, when they were away from the school on excursions. The children were an unusually "happy family" together.

The class presented few problems in discipline. The most difficult problem in class work was to keep all the children from talking at once. One of the surprising things was the almost absolute lack of competition between individuals. Each child worked because he was interested in the class work, and not in order to get ahead of some other child. It is often said that membership in a gifted class will make children conceited. We had practically no evidence of conceit, except in the case of No. 11, who had acquired it before he came to the class. The children were much too busy and happy to think about their own abilities or to boast about them.

The influence of one child on another was often considerable. When No. 11 made a statement which sounded exaggerated, he would look at No. 10 out of the corner of his eye, to discover whether approval or disapproval was written on that sober face. Calm and steady No. 22 sat opposite nervous No. 23, and helped to bring him up into less excitable ways.

When the end of the seventh grade came, and the group was about to leave N School permanently, they organized as a club, with president, and secretary-treasurer, and planned for annual reunions, and as many more gatherings as possible. In June 1920 four or five parties were given by various children of the group, and to these the author was invited. They were very gay and merry affairs, with a variety of games, and of good things to eat. The children gave no evidence of having developed "bookishness," "precociousness," or unpleasant social traits of any kind. Their social and emotional reactions were, as far as the author could

observe, quite as desirable as those of any group of children of similar ages.

One of the most convincing evidences of the good effect of the class on the children came from the united testimony of the parents. They were unanimous in approving of the effect of the class on their children. One mother said that even the neighbors noticed how alert her boy was becoming. Another said that her boy had come "just in time." A third said that she had been planning to take her daughter on a long trip to California, but that she would postpone the journey in order not to deprive her of the "unusual advantages of the class." When the end of school came in 1920, a number of the parents talked with the principal about petitioning for a continuation of the class for a third year at N School; but those who were in close association with the children felt that they should not be kept longer in a building where there were no other classes of the same grade.

The author is of the opinion that more than half of the usefulness of this Special class, beyond that of the ordinary class, was in the progress made in emotional and social development of the children. Intellectual progress was made, but it will perhaps be less significant in the future lives of the children than the other type of progress.

CHAPTER IX

PROGRESS OF THE SPECIAL CLASS CHILDREN IN THE EIGHTH GRADE

IN September, 1920, nineteen members of the Special class entered the eighth grade. Fifteen of these attended the Junior High School of School K, from the elementary school of which some of these children had originally come. The four others, Nos. 3, 7, 17 and 22 entered School C, another Junior High School. Miss C., the Special class teacher, became a teacher of English in School C, and there these four boys were members of her English classes.

At various times during the year 1920-21 the author visited School K, talked with principal and teachers, and observed the children in their class-rooms. Her knowledge of the progress of the four pupils in C came from the reports of their work given her by Miss C.

The fifteen pupils who attended School K were, during the first semester, kept together in the same group, but were placed with other pupils to make classes of from 25 to 30 children. Few other pupils in the school were of the same degree of advancement in French, and so in that study the Special children were in a class by themselves.

During the previous year, the principal of School N had talked with the principal of K several times about the Special children. He, supposedly, knew what the teacher had been trying to do with the children. But this seems to have been a mistaken assumption. The author was unable to visit School K until late in October, and by that time reports had come to her that the children were having difficulties in adjustment. For instance, the mother of one child had visited a class in which the teacher had said to the children, "Especially bright, are you? *I* should say that you were especially stupid!"

The author talked with the principal of the school and found that he seemed to have accepted as fact various wild rumors about the children and their previous work. He had not visited a single class-room in his school in which the children were working, but

had accepted the teachers' complaints without question. The most serious charges against them were that they were babyish in manner and did not know how to study. The author visited each class and talked with four of the teachers. These conversations revealed the fact that they had been misled about the nature of the Special class. The French teacher said, "But I understood that they should be able to do *twice* as good work as the average child!" The history teacher thought them very immature; they asked too many questions; she said they did not know how to study their lessons. The science teacher said that some of the children were immature, but that they undoubtedly had high ability and much general information; that more laboratory work and a much larger library were needed in order to keep the more intelligent busy during the class-hour. The English teacher had such a variable and hysterical temperament that the author did not venture to question her in detail.¹

A study of these complaints, and of the general situation led the author to the following conclusions. Children usually enter the Junior High School at the beginning of Grade 7. It is expected that they will have to take some time to become adjusted to the customs and methods of the departmental school. One principal said that he always expected 7B's to take at least one month in which to learn the ways of the school. The Special children, however, had to learn all these new ways in 8B, in the midst of the regular 8B children. They naturally seemed less mature, more "babyish." Moreover, the chronological age of the Special boys and girls was about three years below that of the average eighth grader. In mental age they were equal to or beyond 8B mental age. But additional chronological years do add a certain amount of maturity and poise, and some of this the Special children may have lacked in comparison with the average pupil. Again, the Special

¹ The author judges the French and history teachers to be good teachers, of a somewhat formal type. The science teacher was the most modern in his methods. The mathematics teacher was changed at least three or four times during the year, and the author was always unfortunate enough to visit that class when the work was entirely written. The English teacher was a middle-aged, frail woman, of very uncertain temper. The children never knew whether she would be gently sweet to them, or would upbraid them with sarcastic comment. The lessons the author saw her teach were so badly taught that the most intelligent children were unable to tell what she meant. On one occasion she taught a lesson in verbs which the children had studied and mastered a year before. But her remarks were so confused that no one in the room understood her, and the children gave every evidence of having "poor lessons."

children had not learned the special methods of study approved by each teacher, and they were blamed for not knowing "how to study." They were quite capable of reading a passage, and reporting the gist of it, but they did not always do this in the approved fashion. Another criticism was that they did not take proper responsibility in doing the work they were supposed to do. Since the children had done this very well the preceding year, this difficulty probably arose out of some temporary situation in School K. Some of the children were undoubtedly intimidated by the new conditions and the adverse criticism they received, and this interfered with their efficiency. The children were also criticised, because in the class discussions, they talked not only about the lesson, but also about everything remotely suggested by the lesson. This seems to the author a fair criticism. In Chapter VI we commented on the fact that the Special children had not learned to limit their remarks to the question under discussion.

It is quite possible to understand why some of the above criticisms were made by teachers who had expected a group of "young geniuses." They failed to consider the fact that children who enter the eighth grade three years younger than the average pupil would be doing *good* work, if they came up to the average performance for 8B. As the first semester progressed the reports of the children's work improved. The assistant principal was intelligently informed concerning the work of the class and she probably did much to improve the general estimate of the children's abilities. The teachers of French, history and science took pains to give the pupils special training where they felt that it was needed. The author occasionally asked the teachers which children were doing the best and which the poorest work. Children Nos. 8, 13 and 20 were consistently placed in the good work group, and 11 and 16 in the poor work group. Nos. 1, 5 and 23 were described as having "real ability" in science.

We will now turn to a consideration of the school-marks obtained by the Special children in the eighth grade. In Table XLVI both the 8B and 8A marks of each of the fifteen children in several subjects are shown. E indicates excellent work; G, good; F, fair; C, condition; P, poor (failure).¹

¹ The 8B marks were copied from the school records by the author. The 8A marks were sent her in the fall of 1921, through the courtesy of Miss N. L. Roth, the assistant principal of School K. The author's thanks are due her, and also

TABLE XLVI

SCHOOL MARKS OF FIFTEEN SPECIAL CLASS CHILDREN AT THE END OF GRADES 8B AND 8A
SCHOOL K

	English		French		Science		History		Mathematics		Gymna-	Music	Manual	Dra-
	8B	8A	8B	8A	8B	8A	8B	8A	8B	8A	sium		Training	matics
1.....	P	F	G	G	E	F	G	F	F	G	E	E	G	G
2.....	F	F	F	F	E	G	F	G	F	G	G	G	G	
5.....	P	G	F	P	E	G	F	F	G	F	G	F	G	G
6.....	E	F	G	F	E	E	G	G	G	G	G	E	G	G
8.....	E	G	E	E	E	E	E	E	E	G	G			
9.....	G	G	E	G	G	G	G	G	G	G	E	F	E	G
11.....	F	F	F	F	E	F	G	F	G	F	G	E	G	G
12.....	G	G	G	G	E	G	G	G	G	G	G	F	G	
13.....	E	E	E	E	E	E	E	G	E	G	E	E	E	E
15.....	E	G	E	E	E	F	E	F	G	G	E	E	E	E
16.....	F	F	F	F	G	F	F	F	G	F	E	G	G	G
18.....	G	F	G	F	G	F	G	F	G	F	E	E	F	
19.....	E	E	E	E	E	G	E	G	E	G	E	E	G	G
20.....	E	E	E	E	E	F	E	E	G	G	E	F	G	G
23.....	P	F(8B)	F	P	G	F	F	F	F	F	G	F	G	

In Grade 8B, three children, Nos. 8, 13 and 19 made E's in the five major subjects; two, Nos. 15 and 20, made four E's and one G each. The poorest records are probably those of Nos. 2, 16 and 23. No. 6, whose readiness for Grade 8 we questioned (see page 167) was surprisingly successful. Her excellent memory was of greater use to her, perhaps, in the work of Grade 8 than in the type of work required in the Special class. No. 16 did not fall as low as she might have been expected to do. There were three failures in 8B, Nos. 1, 5 and 23 in English. From Table XLV, it is an easy matter to learn what these boys did in June 1920 in educational tests related to English work. No. 1 scores as follows: vocabulary, 9-0; completion, 12-1; composition, 9-2. Similar scores for No. 5 are 9-0, 8-2 and 9-5; for No. 23 they are 8-8, 9-4 and 7-9. All that need have been expected at the end of 8B was an achievement of 7-5. One or all may have failed to do the required work, but we have no evidence to indicate that any of these failures were due to lack of *ability* in this field. When the mother of No. 1 told him that he "must *look* interested" in Miss X's class, he replied,

Yes, I try to. But when we raise our hands, she says, "Put your hands down. I'll call on you if I want you to talk." But when we keep our hands down, she says, "What, don't any of you know anything! Why aren't your hands up?"

children 9 and 15 of the Special class, who contributed several hours of time to assembling and copying of these marks. The 8A marks in gymnasium, music, manual training and dramatics were not sent, and therefore do not appear in Table XLVI.

We do not wish to make an undue number of excuses for these boys, but there is no question that to give this English teacher to any class of children was doing them an injustice. For some reason No. 1 and 5 were allowed to continue with 8A English, while No. 23 was required to repeat 8B English. Perhaps the generally low record of 23 was a factor considered by the school authorities.

In Grade 8A, there were no children who made all E's in the major subjects. The best records are probably those of Nos. 8 and 13 (3 E's and 2 G's each), and No. 19 (2 E's and 3 G's) and No. 20 (3 E's, 1 G, 1 F). This is almost the same group as scored highest in 8B. The poorest 8A records are those of 11, 16, 18 and 23; of these 16 and 23 were low in 8B; 11 and 18 have fallen from a considerably higher 8B record. No. 2 who scored low in 8B improved somewhat in 8A. There were two failures in 8A, Nos. 5 and 23 in French. The author was unable to talk with the French teacher after these marks were given, and therefore has no special explanation of them. They were probably both deserved. The low marks of No. 23 may be considered in connection with the description of him on page 175. It is probable that some temperamental difficulty, rather than some lack in native intelligence, explains his low school marks.

The real excellence or poorness of the 8B and 8A marks for the fifteen Special children depends on what the other children in the same grade accomplished. About 90 8B and 80 8A marks, including those of the Special class, were available for each subject, with the exception of French. Distributions of these marks were made, and the percentage of E's, G's, F's, C's and P's in each subject were calculated. This was done separately for the fifteen Special children and for all the other 8th graders. These percentages for 8B and 8A marks are shown in Table XLVII. Here are also given percentages for English, history, science and mathematics combined.

Let us consider first the 8B marks. A rapid survey of Table XLVII shows that the marks of the Special children are equal to or better than those of the other 8B's, with the exception of the P's in English, which we have already discussed. If we compare the two groups by separate subjects the marks of the Special children are clearly better, except in the case of manual training. The superiority of the Special class is greatest in science. In spite of the numerous criticisms of their abilities and methods of working

TABLE XLVII

PERCENTAGE OF EACH MARK OBTAINED IN DIFFERENT SUBJECTS OF GRADES 8B AND 8A. COMPARISON OF FIFTEEN SPECIAL CHILDREN AND ALL OTHERS OF SAME GRADE. SCHOOL K

Subject	Mark	8B		8A	
		15 Special	All other 8B's	15 Special	All other 8A's
English.....	E	40	29	21	21
	G	20	20	36	31
	F	20	46	43	36
	C	0	0	0	7
	P	20	5	0	5
Science.....	E	73	22	33	29
	G	27	53	27	26
	F	0	21	27	29
	C	0	0	0	2
	P	0	4	13	14
History.....	E	33	21	13	3
	G	40	35	40	40
	F	27	39	47	53
	C	0	0	0	0
	P	0	5	0	4
Mathematics.....	E	20	17	0	16
	G	60	37	67	33
	F	20	39	33	43
	C	0	0	0	0
	P	0	7	0	8
Language.....	E			33	29
	G			27	26
	F			27	29
	C			0	2
	P			13	14
Music.....	E	50	23		
	G	14	35		
	F	36	40		
	C	0	0		
	P	0	2		
Manual Training.....	E	21	26		
	G	71	66		
	F	8	8		
	C	0	0		
	P	0	0		
English {	E	42	23	14	14
History {	G	36	36	44	35
Science {	F	17	36	42	42
Math. {	C	0	0	0	2
Math. {	P	5	5	0	7

these fifteen children made marks very considerably higher than those of the average 8B pupil.¹

In 8A marks the Special records are better than all other 8A's, with the possible exception of mathematics. The smallest difference between the two groups is probably in science, where the largest 8B difference was found. This difference in science marks *may* be explained by the fact that the Special children had a different instructor in 8A science, who may have been less inclined to give high marks to the type of ability the Special children possessed. The children themselves felt that the 8A science teacher was a very "hard grader."

It will be noted that the lead of the Special group over the other 8A's is considerably less than their 8B lead. This change is shown most clearly in the combined percentages for English, science, mathematics and history. Both the Special children and the other pupils show a smaller percentage of E's in 8A, and the "all other pupils" group had a larger percentage of failures. Evidently the teachers marked more strictly during the second half of the year. But this difference in total marking is not great enough to account for the smaller percentage of high marks obtained by the Special in 8A.

The total distribution of marks for the 8A semester gives us the information that of 412 marks accorded "all other 8A's," 41, or 10 per cent, were 8B marks, and 11, or 2.6 per cent, were 7B or 7A marks.² For the fifteen Special children only one mark out of 75 was below 8A, 1.3 per cent. The 10 per cent of 8B marks represent failures in 8B work during the first semester. "All other 8A's" is therefore a more highly selected group than "all other 8B's," and this in part accounts for the poorer showing made by the fifteen Special children in the 8A comparison.

Other factors which may account in part for this difference are the following: (1) The Special children, due to their youth and speedier preparation, may have been *less able* to do 8A work than they were to do 8B work. (2) They may have *tried* less hard to do 8A work, a result which might have been due to the gradual effect of the criticism to which they had been subjected, or to an

¹ In January 1921 the median chronological age of these 15 children was 11-8 with a range from 10-6 to 12-11. The median age is at least 3 years below the usual median age for the end of 8B.

² 18 of the 412 marks (4.4 per cent) for "all other 8A's" were higher than 8A. These were all in language courses in which some pupils had done advanced work.

increasing interest in activities other than study. (3) The change in teachers in science has been noted as a possible factor in lowering 8A marks. In mathematics, English and French there were also some teacher changes,—substitutes who taught the class for some weeks, etc. To the best of the author's knowledge history was the only subject in which the Special children had the same teacher throughout both 8A and 8B work. The difference found between the two sets of marks may therefore be due to individual differences in teachers' marking, instead of to differences in the children's work. The foregoing discussion should not cause the reader to lose sight of the fact that in 8A work the Special children made a higher record than did the "all other 8A" group. They are still in the lead, although not as much so as in Grade 8B.

In January 1921 the principal of School K had the Haggerty Intelligence Examination, Delta 2, given to all 8B pupils. Exactly 100 pupils were tested, including the fifteen Special children. The 100 scores ranged from 57 to 155, with a median of 119. Only one Special child, No. 16, fell below the median. Within the group of 100 8B's the rankings obtained by the Special children were as follows: 1, 5, 4, 6, 9, 11.5, 16, 17.5, 17.5, 29, 38, 39, 42, 47, and 55.5. This indicates clearly the superiority of the intelligence of the Special children to many of the other 8th graders.

During the 8A semester the children seem to have had few difficulties of adjustment; they had become merged in the total 8A class, and were no longer subject to special criticism. At the end of the year the principal said these children had undoubtedly had a very trying year, and that they had probably not been properly appreciated during their first months in the school.

These difficulties in adjustment have been reported in detail, because they are typical of what may happen to any similar group of children who enter a school where teachers and principal have not been properly prepared for their reception. Those who knew the Special children well should have taken more pains to make sure that the principal of School K really understood the degree of ability and the type of preparation the children had had. On the other hand, an efficient principal should make it his business to base his judgment on known facts, and not on rumors or opinions.¹

¹ Many of the most unfavorable rumors about the class could probably have been traced to an elementary school teacher who was unsympathetic with all experimental work in education.

The most valuable suggestion for future work in the teaching of gifted children, which was gained from the work of this group in Grade 8, has to do with relevancy of discussion. These children should have learned that a necessary element of good organization of study is to cast aside all but relevant ideas. In attempting to encourage variety of ideas and breadth of interest, their association had not been subjected to adequate control. On the other hand, it must be clearly understood that efficient organization need not mean the extreme formality of class work which was approved by some of the teachers in School K.

Of the four boys who went to School C we cannot write in detail. There were no failures in work in either semester, and some of them, especially No. 22, did very good work. When the boys entered School C there was no class in 8B French, and therefore they all entered 8A French, thus skipping one semester's work. All passed the course, No. 22 with an E, and No. 3 by a close margin. These four boys are members of the Boy Scout group of School C, and are doing excellent work in it.

As far as the author was able to learn none of the nineteen Special class children had any difficulties of adjustment with regard to their classmates in the Junior High. We wondered whether, during the eighth grade year, they had lost any of their charm of manner; whether they had become sophisticated and "grown-up." In June 1921 the children, Miss C, Mrs. S and the author had an evening party together. We found the children as likeable, as simple, as full of fun, as ever. They were as fond of noisy, youthful games; as courteous in making their farewells.¹

Certain writers about the education of gifted children have suggested that such a class should be kept together in a separate group during their whole school course. When we have learned more about methods of teaching such groups, this may prove a wise thing to do, but until we have had much experimentation with methods and curricula it will be desirable to have these children go back and forth from the Special to the regular classes. Thus we may contribute to our knowledge of what is good teaching in both groups. However, as long as we continue to put Special class children back into the regular routine, we must see to it that the teachers there are well informed concerning their abilities, previous work, and future hopes and plans.

¹ The one possible exception to the above has already been noted.

CHAPTER X

SUGGESTIONS FOR FURTHER EXPERIMENTATION IN THE EDUCATION OF GIFTED CHILDREN

IN Chapters II to IX, inclusive, we have discussed in detail the abilities, interests and achievements of a Special class for gifted children which was in session during the school years 1918-19 and 1919-20. At the end of each chapter we have summarized conclusions with respect to the class in question. But the number of children enrolled in this class was too few to make it possible to generalize from these conclusions, and to say, "These statements will hold for all children of similar intelligence, under similar conditions." Our results show a *tendency* only. Their greatest value lies, perhaps, in the indication of specific experimental problems which are worth further investigation.

The author has outlined a series of sixty experimental studies in the education of gifted children, which have been suggested, either directly or indirectly, by the class reported in this book. These include various studies in methods and curricula; in progress and achievement (Accomplishment Quotient changes, progress of gifted not in Special classes, relation of progress to teachers' rating, etc.); collection of data on interests and ambitions; character and will ratings; follow-up work after the children leave the Special class; measures of the influence of equipments, size of class, teacher's ability, parental coöperation, etc. Some of the experiments which seem to the author most useful in the fields of methods and curricula will be described briefly.

The following studies suppose the existence of a large number of Special and Control classes. Tentatively, let the Special class be considered to consist of from 20 to 30 children, with an average I.Q. of 130 or more, a lower limit of 120, and a mental age range of not more than three years. Control class, type I, should represent an "average" class from which the brightest children have been removed; it should have an upper I.Q. limit of 120, a median of 97 or 98, and a mental age range of not more than four years, preferably of not more than three years. Control class, type II, repre-

sents an "average" class from which the brightest children have not been removed; it has no upper and lower I.Q. limits; the median I.Q. is approximately 100; and it has a mental age range of four or more years. When comparison of Special and Control is suggested, it should be understood that comparison of a Special with both types of Control is desirable. Classes may be drawn from any of the elementary school grades, the specific grade varying with the type of problem to be investigated. The ideal place in which to conduct the work suggested in this chapter is probably a large city school system in which the teaching standards are high, and in which the supervisors and administrators are in sympathy with experiment in education.

In studies in which two Special classes are to be compared, not only should the average I.Q.'s and the variability from the average be the same for the two groups, but in so far as possible a given I.Q. and temperament in one class should be matched by a similar child in the second class. In many of the experiments in which a Special and Control class are to be compared, it is desirable that the teaching situation be made as similar as possible for both groups by having teacher A spend half her time in the Special and half her time in the Control; and similarly for teacher B. It is of course necessary that both teachers be in sympathy with the problem, be fair-minded, and have some understanding of the technique of experimentation.

Since the enrollment of Control classes changes so often, it is probable that in many cases the experimental study of a given Special and Control class can be profitably continued only one year. Comparison of two gifted classes should usually be carried over periods of two or more years. The material for these comparisons should include the results of intelligence tests; of educational tests; of physical examinations; the analysis of a large amount of stenographic material recording class work; character-ratings by teachers and parents; and achievement in tests similar to the Downey Will-profile tests.

In the following pages terms will be used in the sense in which they have been previously used in this book, and their use will not be here described in detail.

CURRICULUM

1. Compare two Special classes,¹ one with curriculum which is purely "rapid advancement," and the other with a course which is purely "enriched" type. Continue for two or three years.

2. Try out different types of enriched curriculum with equivalent S's. One may emphasize science; another literature; a third art and music; a fourth history and geography. Compare as to educational achievements and as to possible change in children's interests. Analyze types of electives chosen in high school by children of different Special curricula.

3. Compare 2 S's, one with a large number of studies, the other with half as many. Do bright children do better work with many and varied study-interests, or with a few studies pursued intensively?

4. Compare 2 S's, one with a highly correlated curriculum, the second with no attempt at correlation. (See Chapter VI, page 119.)

5. The foregoing comparisons may be made, although perhaps with less profit, between S's and C's.

6. Compare an S and a C as to success in special courses such as art; music, manual training, cooking and sewing, basing comparisons on standardized tests and scales. May include studies of innate ability in these fields.

7. With a third or fourth grade, teach a foreign language by the direct method, to S and C. Compare success in speaking, reading and writing.

8. Read aloud to S and C a series of books of varied difficulty and type of appeal. Have children rank them as to preferences. Use tests of aesthetic appreciation, such as Abbott-Trabue Poetry tests, with each group.

9. Have children of S and C write original plays, poems, musical compositions, etc. Get careful scores and compare two groups as to aesthetic expression.

10. Teach high school chemistry (or other H. S. subject) to a sixth grade S, and compare results with regular H. S. class. Use same methods, tests, etc., for both groups. Test six months after end of course to find which has retained more. Teach elementary

¹ In the following discussion, "Special class" will be abbreviated as "S," and "Control class" as "C."

statistics to sixth grade S and compare results with college class. Vary methods, but compare as to resultant ability, and as to time used in gaining it.

METHOD

1. Compare an S and a C, using with both informal methods, free discussion, individual reports, projects, etc.

2. Compare S and C, using with both formal methods—drill, explanation, recitation from text, etc.

3. Compare S with formal methods with C with informal methods, and vice versa.

4. Compare 2 S's, one with formal and other with informal methods. Study especially subsequent school progress. In these five experiments make much use of stenographic material for comparison as to questions asked, information volunteered, amount of "side-tracking," etc.

5. Study the effect of monotony on S and C; for instance, teach the same subject, such as fractions, for one-half a day at a time, for a week. Will interest in learning counteract the lack of variety in either or both groups?

6. Compare S and C as to amount of inductive material necessary before the children can arrive at a conclusion in a given field of subject-matter.

7. From daily work in arithmetic get measure of accuracy of computation in S and C. Teach "ideal" of accuracy for one or two weeks. Measure accuracy in daily work again. Any difference in increase of accuracy in two groups?

8. Carry on other experiments in "transfer" with S and C; for instance, from geography of a country to its history. Check results by teaching the history to an S and a C who have not had the specific geography taught.

9. Measure amount of transfer for 2 S's, one in which teacher definitely tries to get transfer from one subject to another, the other in which children are left to get such transfer without help.

10. Teach S and C use of reference books in school library. Compare number of such books drawn out by each group. Compare as to number and quality of all books drawn out.

11. On separate days take an S and a C on the same "excursion," such as to a large factory. On return to school, test information gained. (Use a method which does not require much written

expression.) Repeat tests at end of two or three weeks, for retention measure. Follow same plan for other excursions. Is there any difference in ability to profit from an excursion? Is this all due to previously determined differences in memory? If possible, keep record of number and type of questions asked by each group while on the excursion. In a similar manner try to measure differences in ability to profit from a moving-picture, a stereopticon lecture, a lecture without pictures, etc.

12. Conduct a study with S and C to measure types of compositions which children can write most successfully. Construct series of topics ranging from very concrete and matter-of-fact, to very imaginative. Alternate from one type to another, until five or six of each have been obtained for each group. Have compositions carefully scored and compare results. Any sex differences in either group?

13. S and C, both write compositions, with no opportunity for subsequent discussion and reading aloud; others where children know such opportunity will be given. Two series should be carried on at the same time. Compare results of two series for both groups, for measure of influence of social stimuli, etc.

14. S and C, compositions with no subsequent discussion, but with scores on each given to children, who draw individual practice-curves. Compositions with subsequent discussion, but no scores given. Two series at the same time. Compare results.

15. Compare children of different ages as to (13) and (14). Are younger or older children more dependent on class atmosphere?

16. Careful analyses of special disabilities of gifted, e.g., in spelling. Apply remedial teaching. Same for like defects in C. Which group profits more from the remedial teaching?

The foregoing are some of the suggestions which occur to the author as possible ways of learning how gifted children may best be educated,—how they may at length be added in increasing number to those who, in all fields of high and useful endeavor, go to “increase the radius of the sphere of light.”

APPENDIX

TABLES NOT INCLUDED IN BODY OF TEXT

TABLE XLVIII

STANDARD DEVIATIONS OF AVERAGES AND MEDIANS, FOR DATA IN TABLE VII,
CHAPTER III *

	SPECIAL			CONTROL		
	Feb. 1919	June 1919	June 1920	Feb. 1919	June 1919	June 1920
Addition.....	1.14	1.17	1.59	.87	.94	.87
Subtraction.....	.74	1.23	1.05	.60	.60	.71
Multiplication.....	.56	1.01	1.00	.24	.95	1.05
Division.....	1.09	1.07	1.04	.76	1.01	1.08
Bonsér Reas.....	.81	2.52	2.47	.51	1.43	1.02
Stone Reas.....	....	.58	.61	....	.32	.31
Spelling U.....	6.21	4.74	4.05	2.93	5.00	4.92
Spelling V.....	....	....	5.20	....	....	5.42
Composition I.....	2.36	2.75	1.92	2.47	1.39	1.61
Composition II.....	2.59	2.10	2.04	2.82	1.60	2.06
Completion.....	.18	.18	.26	.25	.25	.20
Geography P.....	4.42	3.25	....	2.54	2.66	....
" R.....	3.38	2.88	....	3.21	3.04	....
" N.....	....	....	3.97	....	....	3.92
" O.....	....	....	3.91	....	....	2.61
Memory:						
Immediate.....	1.68	....	....	1.69	....	....
Deferred.....	2.30	....	....	1.58	....	....
History:						
Thought.....	1.50	1.16	1.13	....	....	....
Char. J.....	.56	.62	.52	....	....	....

* See Chapter III for explanation of cases where S.D. is that of a median, and where it is that of an average.

TABLE XLIX

INDIVIDUAL GRADE-MONTH ACHIEVEMENT IN EDUCATIONAL TESTS

A. SPECIAL—FEBRUARY, 1919

	Add.	Sub.	Mult.	Div.	Vocab.	Read.	Spell.	Compl.	Compo.	Geog.	Median
1.....	5-4	...	4-6	5-3	7-0	5-6	9-1	8-1	5-3	7-9	5-6
2.....	4-4	5-1	4-6	4-9	...	...	...	...	...	...	...
3.....	6-2	6-5	4-8	4-7	6-9	3-9	5-5	4-9	5-4	6-4	5-4.5
5.....	5-6	5-3	4-6	4-4	6-0	5-6	3-4	8-2	4-2	6-7.5	5-4.5
6.....	3-9	5-1	4-8	4-9	...	...	4-5	7-2	...	5-0	5-0.5
7.....	5-1	4-9	4-4	...	4-9	4-4	3-1	5-6	4-4	4-4	4-6.5

TABLE XLIX—Continued

	Add.	Sub.	Mult.	Div.	Vocab.	Read.	Spell.	Compl.	Compo.	Geog.	Median
8.....	3-9	5-1	4-1	4-4	4-5	5-9	...	5-9	4-7	8-7	5-1
9.....	4-8	5-5	4-1	5-6	4-4	4-8	3-1	4-5	7-1	7-4	4-8
11.....	3-9	4-2	...	4-1	...	5-0	6-3	6-3	7-4	8-3	5-7.5
12.....	6-6	5-8	4-9	4-9	...	4-1	4-2	4-3	7-6	5-7.5	4-9
13.....	5-4	5-1	4-6	5-0	6-3	7-4	3-9	8-3	8-9	5-5.5	5-7.5
15.....	5-4	4-6	4-4	4-7	...	3-8	4-5	6-7	7-5	5-2	4-9.5
16.....	5-4	4-4	4-6	3-8	...	5-2	...	5-5	6-9	3-5.5	5-2
17.....	6-6	...	4-9	4-1	4-9	4-4	6-0	5-5	5-5	5-3	5-1
18.....	...	...	...	3-7	6-7	5-2	5-2	7-9	...	4-8	5-2
Median	5-4.2	5-1.5	4-6.5	4-7.5	6-0.5	5-0.2	4-5.5	6-1	6-2	5-6.5	5-1.5
Aver....	5-2	5-1.3	4-5.7	4-6.1	5-7.3	5-0.5	4-9	6-3.5	6-2.4	6-0.7	...

B. CONTROL—FEBRUARY, 1919

1.....	...	4-9	4-0	4-6	...	3-4	...	4-6	3-6	4-3	
3.....	5-1	5-1	4-5	4-7	5-8	...	2-2	4-6	6-5	3-9	4-7.5
4.....	3-4	4-4	3-7	4-0	3-7	3-6	2-6	3-3	2-9	3-2	3-5
5.....	3-1	5-1	4-1	4-4	3-7	3-8	4-2	...	8-0	4-4.5	4-2.5
8.....	3-1	4-2	3-5	3-8	...	4-5	5-2	3-2	4-1	3-6.5	3-8.5
11.....	3-1	4-4	4-1	4-1	4-2	5-9	3-4	5-0	6-7	3-4	4-1.5
13.....	3-9	4-6	...	4-1	...	5-5	...	3-3	6-0	...	4-3.5
17.....	4-1	3-7	4-6	4-9	2-6	3-8	2-6	2-9	4-5	2-1.5	3-7.5
18.....	3-9	4-2	4-1	4-3	5-3	5-4	3-1	7-7	7-3	5-4	4-8
27.....	3-6	3-5	4-2	3-7	3-6	...	...	3-2	4-2	3-7.5	3-6.5
29.....	2-8	5-1	4-2	4-9	1-0	3-8	1-0(?)	3-2	3-1	3-0	3-1.5
32.....	5-6	3-9	4-4	3-7	4-6	3-8	1-0(?)	3-1	2-3	3-4.5	3-7.5
33.....	2-6	3-9	3-8	4-3	4-5	3-9	2-6	4-1	4-5	6-2	4-0
35.....	4-1	4-6	3-8	4-6	3-0	3-9	2-9	5-8	5-1	3-1.5	4-0
Median	3-6.5	4-4.25	4-1.8	4-2	3-9.5	3-9.3	2-9.5	3-3.5	4-5.5	3-6.5	4-0.5
Aver....	3-7.2	4-3.6	4-1.5	4-2.5	3-8.8	4-3.6	3-0.2	4-1.1	4-9.9	3-7.9	...

C. CONTROL—JUNE, 1920

1.....	...	4-4	4-6	5-0	...	5-7	...	5-1	7-1.5	5-0.5	
3.....	5-9	5-5	4-2	5-4	5-6	...	5-0	7-6	5-9	6-7	5-6.5
4.....	4-1	4-4	4-8	4-6	4-6	5-6	8-1	6-3	5-5	5-1	4-9.5
5.....	4-4	6-8	5-5	7-0	7-9	7-7	7-3	...	6-9	7-4.5	7-0.5
8.....	3-9	4-6	5-2	4-9	...	5-6	8-6	4-2	5-0	8-1.5	5-0.5
11.....	5-1	5-5	4-0	4-4	4-6	7-6	6-0	7-2	6-6	7-5.5	5-7.5
13.....	3-9	5-1	...	3-3	...	7-8	...	7-1	7-5	...	6-1
17.....	4-8	3-9	5-6	4-7	4-2	5-6	4-7	4-7	5-2	3-7	4-7.5
18.....	5-1	5-1	5-5	5-2	6-5	7-8	6-5	7-2	7-7	6-0	6-2.5
27.....	3-6	4-4	4-4	3-8	6-1	...	...	5-1	4-1	6-9	4-4.5
29.....	5-4	5-8	4-8	6-0	5-0	5-5	5-0	5-9	3-9	5-6.5	5-4.5
32.....	5-4	5-5	4-8	5-0	6-5	5-4	3-9	5-1	7-0	7-3	5-4.5
33.....	4-9	5-1	4-6	4-7	5-6	8-8	4-2	7-1	7-0	5-6.5	5-3.5
35.....	4-6	5-8	5-2	5-2	5-9	6-7	6-9	8-3	7-4	4-8.5	5-8.5
Median	4-8.5	5-1	4-8.5	4-8	5-6.5	6-7.5	5-8.5	6-7	6-2.5	6-7.5	5-7.5
Aver....	4-7	5-1	4-8.5	4-9.1	5-6.3	6-7.4	6-0	6-3.2	6-0.6	6-3.1	...

D. SPECIAL—JUNE, 1920

Median	6-6.3	7-2.5	7-0.5	7-0.7	9-0	7-3.25	7-1	9-0.5	8-7.5	7-2	...
Aver....	6-5.7	7-0.5	6-9.7	6-8.6	8-1	7-7.5	6-7.3	8-7.3	8-8	7-3	...

TABLE LIV

HEIGHT AND WEIGHT. SPECIAL CLASS. NOVEMBER 21, 1919

	Age Nov. 21	Height in Inches	Weight in Pounds	Standard Weight for Height and Age	Per Cent Over or Under Weight
1.....	9- 8	52	74.75	62	20.5
2.....	9- 4	55	68.25	65	5.0
3.....	11- 1	53	64.25	65	- 1.2
5.....	11- 7	57.75	86.25	84	2.7
6.....	10- 6	53	64.25	63	2.
7.....	11- 2	56.5	72.25	74	- 2.4
8.....	11- 1	52	68.75	61	12.7
9.....	11- 4	55.5	73.75	72.5	1.7
11.....	11- 7	56.75	81.25	79	2.8
12.....	10- 5	53.5	66.75	66.5	.3
13.....	11- 4	.....	.....	.....	.....
15.....	10- 9	50	60.75	59	3.
16.....	10- 7	51.5	68.25	61	11.9
17.....	9-11	55.75	59.00	71	-16.9
18.....	10- 6	53.75	64.50	68	- 5.1
19.....	11- 9	58.5	72.75	85.5	-14.9
20.....	11- 2	55.5	66.75	72.5	- 7.9
21.....	11-10	57.5	101.75	81.5	24.8
22.....	12- 5	55	89.50	75	19.3
23.....	10- 9	51.5	63.75	61	4.5

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